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# Reconsidering Regulatory Uncertainty: Making a Case for Energy Storage

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# RECONSIDERING REGULATORY UNCERTAINTY: MAKING A CASE FOR ENERGY STORAGE

AMY L. STEIN\*

## ABSTRACT

*This Article begins the complex dialogue that must take place to address the emerging technologies providing energy storage for our electricity grid. Energy storage has the capacity to be a game-changer for many facets of our grid, providing better integration of renewable energy, enhanced reliability, and reduced use of carbon-intensive fuels. Energy storage faces a number of obstacles, however, including technological, financial, and regulatory uncertainty. This Article focuses on the regulatory uncertainty, and defends the proposition that not all regulatory uncertainty is created equal. It argues for differential treatment of this uncertainty, depending on its context, scope, and source, and applies this framework to the uncertainty surrounding the classification of energy storage. It finds that this uncertainty operates against high baseline levels of uncertainty in the energy industry, is limited in its scope, and is intentionally embraced by the federal regulators in an effort to realize the benefits of regulatory uncertainty. This Article asserts that this form of uncertainty is one that can be managed in a way to avoid stifling the development of this important technology. This Article sets forth strategies for regulators and regulated entities to continue to function, even within this zone of regulatory uncertainty.*

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## I. INTRODUCTION

Few people think about electricity and grid reliability until they lose power. “There have been five massive [electricity] blackouts [in the United States] over the past 40 years, three of which have occurred in the past nine years.”<sup>1</sup> In 2003, the United States suffered its largest blackout in history, affecting about forty-five million people and costing approximately six billion dollars in losses.<sup>2</sup> Nine nuclear power plants shut down, cities were left without water, flights were grounded, and traffic chaos ensued in rush hour without traffic signals.<sup>3</sup> In the summer of 2011, Texas barely avoided rolling blackouts, and only by paying up to thirty times the normal price of electricity.<sup>4</sup> The Department of Energy (DOE) estimates that power outages and interruptions cost Americans more than 150 billion dollars each year.<sup>5</sup> Extreme weather events associated with climate change, combined with aging energy infrastructure, suggests that the frequency of such blackouts is likely to increase before it decreases.<sup>6</sup>

In addition to power disruptions, our grid is plagued by a number of inefficiencies. Within our current grid, electricity must be used instantaneously, meaning there is tremendous pressure on our nation’s grid operators to ensure that the demand (or load) is constantly in equal balance with the supply.<sup>7</sup> This has led to a

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1. LITOS STRATEGIC COMMC’N, U.S. DEPT’ OF ENERGY, *THE SMART GRID: AN INTRODUCTION* 7, available at [http://energy.gov/sites/prod/files/oeprod/DocumentsandMedia/DOE\\_SG\\_Book\\_Single\\_Pages\(1\).pdf](http://energy.gov/sites/prod/files/oeprod/DocumentsandMedia/DOE_SG_Book_Single_Pages(1).pdf) (prepared for the U.S. Dep’t of Energy).

2. *Id.* at 8-9.

3. Jaime Holguin, *Biggest Blackout in U.S. History*, CBS NEWS (Aug. 15, 2003), <http://www.cbsnews.com/news/biggest-blackout-in-us-history>.

4. *Packing Some Power*, ECONOMIST (May 3, 2012), <http://www.economist.com/node/21548495>.

5. LITOS STRATEGIC COMMC’N, *supra* note 1, at 5.

6. U.S. DEPT’ OF ENERGY, U.S. ENERGY SECTOR VULNERABILITIES TO CLIMATE CHANGE AND EXTREME WEATHER 2-3, 35 (2013), <http://energy.gov/sites/prod/files/2013/07/f2/20130710-Energy-Sector-Vulnerabilities-Report.pdf>; *Superstorm Sandy: More Than 7 Million Without Power*, CBS NEWS (Oct. 30, 2012), <http://www.cbsnews.com/news/superstorm-sandy-more-than-7-million-without-power/> (noting Superstorm Sandy left 7.9 million customers across the Mid-Atlantic States and New England without power).

7. *Regulatory Organizations*, W. FARMERS ELEC. COOP., <http://www.wfec.com/operations/governing-bodies> (last visited June 14, 2014) (“Unlike water or gas, electricity

preference for baseload sources that can run at near one-hundred percent capacity and expensive construction and maintenance of “peaker plants,” which are power plants that are only called upon for a few hours each day to cover the large disparity between off-peak and on-peak electricity demands.<sup>8</sup> Additionally, millions of potential megawatt-hours of electricity generation from intermittent renewable energy resources like wind and solar are wasted due to transmission constraints.<sup>9</sup> This wasted renewable energy is particularly ironic, given our nation’s efforts to better integrate renewable energy into our electricity portfolio<sup>10</sup> and to reduce the conventional pollutants and greenhouse gas emissions emitted from fossil fuels.<sup>11</sup>

Although these costs and inefficiencies are diverse, they all can be addressed through one technology: energy storage. Energy storage in this context refers not to the storage of a primary fuel such as natural gas, but the energy storage of previously generated electric energy (potential, kinetic, chemical, or thermal energy) to be released at a later time. The Federal Energy Regulatory Commission (FERC) defines an energy storage asset as “property that is interconnected to the electrical grid and is designed to receive electrical energy, to store such electrical energy as another energy form, and to convert such energy back to electricity and deliver such electricity for sale, or to use such energy to provide reliability or economic benefits to the

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cannot be stored. It must be generated as it is needed, and supply must be kept in balance with demand.”).

8. See, e.g., Abby Gruen, ‘Peakers’ Plants Provide Electricity When It’s Hot, but at the Highest Price, STAR-LEDGER (July 20, 2010, 2:51 PM), [http://www.nj.com/business/index.ssf/2010/07/peakers\\_plants\\_provide\\_electri.html](http://www.nj.com/business/index.ssf/2010/07/peakers_plants_provide_electri.html) (explaining that “peakers” are comparatively expensive to operate, costing ratepayers thirteen million dollars annually to keep a single peaker plant in New Jersey operational).

9. See, e.g., William Pentland, *Transmission Bottlenecks Bad News for Renewable Energy*, FORBES (May 3, 2011, 11:33 PM), <http://www.forbes.com/sites/williampentland/2011/05/03/transmission-bottlenecks-bad-news-for-renewable-energy/> (“In some areas where the constraints are especially acute like Oregon and Washington State, the lack of spare transmission capacity could force wind farms that have already been built to shut down on a rolling basis in the near future.”).

10. See, e.g., Barack Obama, President of the United States of America, Remarks by the President on Climate Change at Georgetown University (June 25, 2013), available at <http://www.whitehouse.gov/the-press-office/2013/06/25/remarks-president-climate-change> (“Today, I’m directing the Interior Department to green light enough private, renewable energy capacity on public lands to power more than 6 million homes by 2020.”).

11. See U.S. EPA, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990–2011, at 3-5 to -7 (2013) [hereinafter EPA, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS]; *Clean Energy: Air Emissions*, U.S. EPA, <http://www.epa.gov/cleanenergy/energy-and-you/affect/air-emissions.html> (last updated Sept. 25, 2013) (“Fossil fuel-fired power plants are responsible for 67 percent of the nation’s sulfur dioxide emissions, 23 percent of nitrogen oxide emissions, and 40 percent of man-made carbon dioxide emissions.”).

grid.”<sup>12</sup> By eliminating the historical limitation of the grid requiring instantaneous use, energy storage has the potential to drastically alter the way the electricity grid functions.<sup>13</sup>

Some forms of energy storage, such as pumped hydropower storage, have been the historic face of bulk energy storage<sup>14</sup> for over a hundred years.<sup>15</sup> But the world is bracing for the next generation of bulk energy storage to address reliability, economic efficiency, and environmental issues plaguing the electric grid. In addition to pumped hydropower storage, this next generation will expand to include some combination of batteries, flywheels, fuel cells, superconducting magnets, and compressed air energy storage.

While these emerging technologies bring great promise, they also bring great uncertainty. There is uncertainty about the specific technologies that will be cost-effective for the grid, the market forces that will drive energy investments, the legal and regulatory

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12. Third-Party Provision of Ancillary Services; Accounting and Financial Reporting for New Electric Storage Technologies, Order No. 784, 144 FERC ¶ 61,056, ¶ 172 (July 18, 2013) [hereinafter FERC Order No. 784]; see also CAL. PUB. UTILS. COMM’N, ELECTRIC ENERGY STORAGE: AN ASSESSMENT OF POTENTIAL BARRIERS AND OPPORTUNITIES 2-3 (2010), available at [http://www.cpuc.ca.gov/NR/rdonlyres/71859AF5-2D26-4262-BF52-62DE85C0\\_E942/0/CPUCStorageWhitePaper7910.pdf](http://www.cpuc.ca.gov/NR/rdonlyres/71859AF5-2D26-4262-BF52-62DE85C0_E942/0/CPUCStorageWhitePaper7910.pdf) (“[Electric energy] storage can be defined as: a set of technologies capable of storing previously generated electric energy and releasing that energy at a later time. EES technologies may store electrical energy as potential, kinetic, chemical, or thermal energy, and include various types of batteries, flywheels, electrochemical capacitors, compressed air storage, thermal storage devices and pumped hydroelectric power.”).

13. In fact, some utilities view energy storage as a “disruptive force.” PETER KIND, EDISON ELEC. INST., DISRUPTIVE CHALLENGES: FINANCIAL IMPLICATIONS AND STRATEGIC RESPONSES TO A CHANGING RETAIL ELECTRIC BUSINESS 3 (2013), available at <http://www.eei.org/ourissues/finance/Documents/disruptivechallenges.pdf>. Although one could only imagine utilities as obsolete if there was a fully viable distributed energy alternative, a prospect that does not seem feasible in the short-term, the same was probably said about telephone customers not being able to “cut the cord” from their phone company, yet now many have chosen to go completely cellular. *Id.* at 5. There are many similarities between the energy grid and the telecommunications network, see Amy L. Stein, *The Tipping Point of Federalism*, 45 CONN. L. REV. 217 (2012), and plummeting profits on the road to such “disruptive” transitions is one similarity that they may not choose to share.

14. Bulk energy “refers to the network of interconnected generation and transmission lines, while the distribution system refers to the lower-voltage generally radial lines that deliver electricity to the final customer.” 4 NAT’L RENEWABLE ENERGY LAB., BULK ELECTRIC POWER SYSTEMS: OPERATIONS AND TRANSMISSION PLANNING 22-1 (2012), available at <http://www.nrel.gov/docs/fy12osti/52409-4.pdf>.

15. There is approximately twenty-two gigawatts (GW) of pumped-storage hydropower (PSH) deployed in the United States across forty sites, most of which was developed between 1970 and 1990. *Pumped Storage Provides Grid Reliability Even with Net Loss*, U.S. ENERGY INFO. ADMIN. (July 8, 2013), <http://www.eia.gov/todayinenergy/detail.cfm?id=11991>; see also PAUL DENHOLM ET AL., NAT’L RENEWABLE ENERGY LAB., THE ROLE OF ENERGY STORAGE WITH RENEWABLE ELECTRICITY GENERATION 7-8 (2010), available at <http://www.nrel.gov/docs/fy10osti/47187.pdf>.

environment into which energy storage will be thrust, and their integration into resource adequacy and transmission planning.<sup>16</sup> This Article does not purport to tackle all of this uncertainty, but focuses on the regulatory uncertainty facing energy storage entities.<sup>17</sup> To simplify syntax, however, this Article will refer to “regulatory uncertainty” as “uncertainty” wherever possible.

One of the most fundamental uncertainties surrounds whether energy storage is treated as a generation, transmission, or distribution asset, a classification that affects jurisdictional and cost-recovery determinations.<sup>18</sup> Such uncertainties are regularly cited as barriers to energy storage development,<sup>19</sup> as they are in many other

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16. For instance, grid operators may be most affected by the technological uncertainty of the response time, duration, and availability of energy storage and their integration into resource adequacy and transmission planning.

17. Christian Engau & Volker H. Hoffmann, *Corporate Response Strategies to Regulatory Uncertainty: Evidence from Uncertainty About Post-Kyoto Regulation*, 44 POL’Y SCI. 53, 54 (2011) (“[T]he term ‘regulatory uncertainty’ . . . refer[s] to uncertainty associated with the actions of governmental agencies that create and enforce regulations and [is] define[d] . . . as a firm’s ‘inability to predict the future state of the regulatory environment.’” (internal citations omitted)); Frances J. Milliken, *Three Types of Perceived Uncertainty About the Environment: State, Effect, and Response Uncertainty*, 12 ACAD. OF MGMT. REV. 133, 136 (1987). This definition is not entirely unsatisfactory, proposing to encompass almost any situation where regulated entities cannot predict the future. A better definition may be ambiguity caused by agency inaction, delays, changes in leadership, inconsistencies, vagueness, or similar actions.

18. The traditional public utility model operates on a system of cost-of-service ratemaking, whereby a public utility commission (PUC) approves a rate that a utility may charge its customers based on a base rate, multiplied by a rate of return and operating costs. See FED. ENERGY REGULATORY COMM’N, COST OF SERVICE RATES MANUAL 6-7 (1999), available at <http://www.ferc.gov/industries/gas/gen-info/cost-of-service-manual.doc>. Energy assets receive unusual regulatory treatment in most states because they are regulated as a natural monopoly, in which energy providers charge customers in their territory a rate set by the state (or, for wholesale transmission, FERC), and the state must approve decisions about what infrastructure and other costs the providers may recover through the rates. See *infra* Part III.

19. See ANITA LUONG, AM. INST. OF CHEM. ENG’RS, GRID SCALE ENERGY STORAGE: ADDRESSING THE REGULATORY AND POLICY BARRIERS 21 (2011), available at [http://www.wise-intern.org/journal/2011/documents/ALuong\\_Final\\_GridScaleEnergyStorage\\_2nded.pdf](http://www.wise-intern.org/journal/2011/documents/ALuong_Final_GridScaleEnergyStorage_2nded.pdf) (“Regulatory barriers are the main challenges that deployment of grid-scale energy storage face.”); Thomas P. Lyon & Jing Li, *Regulatory Uncertainty and Regulatory Scope* 3 (July 11, 2003) (unpublished manuscript), available at [http://www.researchgate.net/publication/228416428\\_Regulatory\\_uncertainty\\_and\\_regulatory\\_scope/file/79e4150ed778a9549a.pdf](http://www.researchgate.net/publication/228416428_Regulatory_uncertainty_and_regulatory_scope/file/79e4150ed778a9549a.pdf) (“[T]he former chairman of the Massachusetts Public Utilities Commission lament[ed] the fact that ‘[a] wide range of tools is available . . . to enhance grid flexibility. Uptake of these technologies, however, has languished in an environment of regulatory uncertainty.’”); Rick Drom, Andrews Kurth LLP, *Critical Drivers for Utility-Scale Renewable Energy* 18 (Jan. 19, 2011) (PowerPoint presentation), available at <http://www.acore.org/wp-content/uploads/2011/03/smart-grid-regulatory-Drom.pdf> (“Regulatory certainty is necessary to reduce investor risk and provide for continued development of Energy Storage technologies.”).

emerging technology contexts.<sup>20</sup> For instance, the DOE notes that “[r]egulatory issues at the federal and state level may limit the value proposition for energy storage and removing them may be necessary to level the playing field with other technologies.”<sup>21</sup> “Overall, the value of storage is highly system-dependent, location-dependent, and subject to risk and uncertainty; technical, regulatory, and financial.”<sup>22</sup> State legislators and regulators make similar statements, as exemplified by California’s recent energy storage bill<sup>23</sup> and accompanying California Public Utility Commission orders.<sup>24</sup>

Instead of clarifying this uncertainty, FERC explicitly embraced it, pointing to the fact-specific nature of the inquiry required of energy storage technologies, technologies that are capable of performing any and all of the functions traditionally attributed to generation, transmission, and distribution assets.<sup>25</sup> Stakeholders criticize the resulting uncertainty and argue that lingering ambiguity surrounding such fundamental issues can stifle investments in

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20. See *City of Dearborn v. Comcast of Michigan III, Inc.*, No. 08-10156, 2008 WL 4534167, at \*1 (E.D. Mich. Oct. 3, 2008) (“The rise in cable television technology initially created legislative and regulatory uncertainty.” (citing *Alliance for Cmty. Media v. FCC*, 529 F.3d 763, 767 (6th Cir. 2008))); Robert Falkner & Nico Jaspers, *Regulating Nanotechnologies: Risk, Uncertainty and the Global Governance Gap*, 12 GLOBAL ENVTL. POL. 30, 31 (discussing regulatory challenges in the burgeoning field of nanotechnology); Alfred A. Marcus, *Policy Uncertainty and Technological Innovation*, 6 ACAD. MGMT. REV. 443, 443-44 (1981) (exploring the effects of regulatory uncertainty on the development of then-emerging technologies such as cogeneration and the use of composite fuels made of pulverized coal); Uma Outka, *Environmental Law and Fossil Fuels: Barriers to Renewable Energy*, 65 VAND. L. REV. 1679, 1691 (2012) (“Regulatory uncertainty is an obvious and significant barrier to consistent investor confidence in renewable energy.”); Kevin Drum, *Carbon Pricing and Regulatory Uncertainty*, MOTHER JONES (July 26, 2010), <http://www.motherjones.com/kevin-drum/2010/07/carbon-pricing-and-regulatory-uncertainty>.

21. U.S. DEP’T OF ENERGY, ANALYTIC CHALLENGES TO VALUING ENERGY STORAGE 2 (2011).

22. *Id.* at 3.

23. A.B. 2514, 2009 Leg., 10th Reg. Sess. (Cal. 2010) (amending CAL. PUB. RES. CODE § 2536 (West 2009) & CAL. PUB. UTIL. CODE §§ 454.3, 9615, 9620 (West 2009)), available at [http://www.leginfo.ca.gov/pub/09-10/bill/asm/ab\\_2501-2550/ab\\_2514\\_bill\\_20100820\\_amended\\_sen\\_v90.html](http://www.leginfo.ca.gov/pub/09-10/bill/asm/ab_2501-2550/ab_2514_bill_20100820_amended_sen_v90.html) [hereinafter Cal. A.B. 2514] (“There are significant barriers to obtaining the benefits of energy storage systems, including . . . inadequate statutory and regulatory support.”).

24. Cal. Pub. Util. Comm’n, Order Instituting Rulemaking Pursuant to Assembly Bill 2514 to Consider the Rulemaking 10-12-007 at 3 (Dec. 16, 2010), available at <http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M065/K706/65706057.PDF> (identifying the “[l]ack of cohesive regulatory framework” as one of the primary barriers to energy storage).

25. Eric Wesoff, *FERC’s Commissioner on Energy Storage*, GREENTECH MEDIA (Jan. 18, 2011), <http://www.greentechmedia.com/articles/read/the-view-from-ferc-on-energy-storage/>.

energy storage and disrupt the long-term planning involved in such capital-intensive endeavors.<sup>26</sup>

Investment in energy storage need not be stifled by regulatory uncertainty. In fact, FERC's embrace of ambiguity with respect to energy storage provides an opportunity to reconsider the role of this uncertainty. This evaluation demonstrates that there are multiple varieties of uncertainty with differing degrees of impacts. This multifaceted view of uncertainty—along a spectrum—suggests that the responses may be similarly varied. This Article does not claim to resolve the uncertainty associated with energy storage, but instead argues that the uncertainty is manageable, and perhaps even beneficial to an emerging technology. To this end, this Article also sets forth a path toward resolving the uncertainty.

Part II of this Article explores the fundamentals of energy storage and its attendant uncertainty. This Part provides a flavor for the various energy storage technologies that make up this catchall term. It explains the multiple functions and value streams of energy storage that contribute to their complicated legal status. It then analyzes the fundamental uncertainty surrounding FERC's treatment of bulk energy storage as a generation or a transmission asset and the resulting jurisdictional and cost recovery implications.

Part III defends the proposition that not all uncertainty is created equal. For instance, some uncertainty is the result of coordination problems involving multiple actors, some uncertainty is the result of a single actor, some uncertainty surrounds whether an activity will be regulated at all, and some uncertainty surrounds how an activity will be regulated. It explores situations where uncertainty is particularly troublesome and those situations where the law has embraced uncertainty. It creates a new framework for evaluating and characterizing these different varieties of uncertainty along a spectrum, depending on three critical features: (1) the context, (2) the scope, and (3) the source of the uncertainty. Whereas high levels of uncertainty may justify avoiding the uncertainty, low levels of uncertainty associated with an activity are more deserving of efforts to resolve the uncertainty.

Applying this framework to the uncertainty facing energy storage reveals a level of uncertainty that can be managed in a way to avoid stifling the development of this important technology. When the critical features of energy storage uncertainty are analyzed, it becomes clear that this uncertainty is consistent with the general uncertainty that surrounds the energy industry, the scope is narrower than other types of uncertainty, and the source of the

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26. See *infra* notes 264-67 and accompanying text.



uncertainty is one federal agency intentionally seeking to reap the advantages of energy storage in a world where the law is struggling to keep up with the technology.

Given its place on the uncertainty spectrum, Part IV proposes strategies for stakeholders and regulators to continue to function within this zone of uncertainty. This is particularly important for an emerging technology that is required to compete against entrenched incumbent fossil fuel generators.<sup>27</sup> It explains how regulated entities can harness the benefits of federalism by encouraging state initiatives, developing precedent through FERC orders, and continuing to acquire important information necessary for eventual resolution of the uncertainty. Part IV describes how regulators can help narrow the range of uncertainty as well. Public utility commissions can craft creative cost recovery mechanisms, and FERC can develop a framework for its decisionmaking process that will guide and provide consistency for future case-by-case determinations. These efforts can establish gradual norms that narrow the range of uncertainty so that it does not paralyze the deployment of energy storage technologies.

The hope is that, similar to other emerging technologies, “the relative novelty of these [new emerging] technologies . . . suggests that the interests on different sides of each issue are less likely to have ossified into permanent resistance to compromise,” allowing more room for both the regulator and the regulated to work together to resolve uncertainty.<sup>28</sup> Such strategies can have implications for emerging technologies operating in the shadow of uncertainty that extend far beyond energy storage.

## II. ENERGY STORAGE AND ITS REGULATORY UNCERTAINTY

Most individuals are surprised to learn about the extent of energy storage projects that are already functioning on a commercial level. They may be even more surprised to learn that the federal government has identified over seventeen different applications of energy storage for the electricity grid.<sup>29</sup> This Part begins by providing

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27. Jon Wellinghoff, the chairman of FERC from 2009–2013, said in an interview in 2013 that solar will “overtake everything,” and said that once storage is brought into the equation it is pretty much “game over” for traditional forms of generation. Herman K. Trabish, *FERC Chair Jon Wellinghoff: Solar 'Is Going to Overtake Everything'*, GREENTECHMEDIA (Aug. 21, 2013), <http://www.greentechmedia.com/articles/read/ferc-chair-wellinghoff-sees-a-solar-future-and-a-utility-of-the-future>.

28. David A. Striffling, *Environmental Federalism and Effective Regulation of Nanotechnology*, 2010 MICH. ST. L. REV. 1131, 1159 (2010).

29. JIM EYER & GARTH COREY, SANDIA NAT'L LABS., *ENERGY STORAGE FOR THE ELECTRICITY GRID: BENEFITS AND MARKET POTENTIAL ASSESSMENT GUIDE* 21 tbl.3 (2010).

an introduction to various types of energy storage technologies. It then explains the various benefits of energy storage for our electrical grid. It concludes by analyzing the primary uncertainty facing energy storage: how to classify energy storage assets according to the existing taxonomy that was designed for more traditional energy sources.

### A. Energy Storage Technologies

Bulk energy storage consists of a suite of technologies used to hold the energy from previously generated electricity at times of low demand until demand is high or transmission lines are freed up to transmit the electricity.<sup>30</sup> Bulk energy storage in the United States is dominated by pumped-storage hydropower (PSH), a century-old technology that uses cheaper off-peak electricity to pump water from a lower to an upper reservoir and then releases the water to turn turbines to generate electricity during on-peak hours.<sup>31</sup> Although it has the capacity to provide price advantages, PSH has generated its share of controversy over the years, with critics pointing to energy inefficiencies and adverse environmental impacts of damming water.<sup>32</sup> There are approximately twenty-two gigawatts (GW) of PSH deployed in the United States across forty sites, much of which was built between 1970 and 1990.<sup>33</sup> Pumped storage developers have

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30. "Bulk" storage or "grid-scale" storage is to be distinguished from "distributed" energy storage, which involves a smaller, customer-specific application. Included in this form of energy storage are electric vehicle batteries and on-site generators. *Compare InterContinental Hotels Group*, DOE GLOBAL ENERGY STORAGE DATABASE, SANDIA NAT'L LABS., <http://www.energystorageexchange.org/projects/356> (last visited June 14, 2014) (detailing distributed energy storage projects at two San Francisco hotels that utilize Lithium ion batteries to avoid high demand charges), *with KCP&L SmartGrid Innovation Park*, DOE GLOBAL ENERGY STORAGE DATABASE, SANDIA NAT'L LABS., <http://www.energystorageexchange.org/projects/1297> (last visited June 14, 2014) (deploying similar battery storage technology to support grid-scale energy delivery at peak demand times of day in Kansas City). Tesla's plans for a new \$5 billion "gigafactory" has a projected output of 35 GW per year, which would exceed the worldwide production of lithium ion batteries in 2013. Thomas Overton, *The Year Energy Storage Hit Its Stride*, POWER MAG. (May 1, 2014), <http://www.powermag.com/the-year-energy-storage-hit-its-stride>.

31. Chi-Jen Yang & Robert B. Jackson, *Opportunities and Barriers to Pumped-Hydro Energy Storage in the United States*, 15 RENEWABLE & SUSTAINABLE ENERGY REVIEWS 839, 839-40 (2011).

32. *E.g.*, Eric Wesoff, *Update: California Energy Storage Bill AB 2514 Signed Into Law by Governor*, GREENTECHMEDIA (Sept. 29, 2010), <http://www.greentechmedia.com/articles/read/vc-meas-gunderson-on-utility-scale-storage> ("In California, 'we're taking down dams not putting them up.'").

33. *Pumped Storage*, *supra* note 15 ("There are 40 pumped storage sites operating in the United States . . . totaling more than 22 gigawatts (GW) of storage capacity, roughly 2% of U.S. generating capacity."); *see also* DEHOLM ET AL., *supra* note 15, at 7-8 & n.14 ("To place these values in perspective, between 1993 and 2008, more than 320 GW of conventional capacity was constructed in the United States. With the exception of the

refined the technology to increase efficiency,<sup>34</sup> and the international interest in PSH is growing.<sup>35</sup> Nevertheless, this form of storage is geographically constrained.

The next generation of grid-scale energy storage includes compressed air energy storage (CAES), a technology that uses off-peak energy to drive compressors that inject air into an underground storage cavern.<sup>36</sup> The air heats as it is compressed, and this heat energy is later released to turn turbines and generate electricity back onto the grid during on-peak hours. Only one large CAES 110 megawatt (MW) commercial facility has been constructed in the United States in McIntosh, Alabama, but it is leading the way for future projects.<sup>37</sup> CAES projects are planning to move forward in both Ohio<sup>38</sup> and Texas,<sup>39</sup> and Nebraska<sup>40</sup> may not be far behind. Recent

completion of previously started PHS facilities and a few demonstration projects, no significant storage capacity was added.”).

34. NAT'L HYDROPOWER ASS'N'S PUMPED STORAGE DEV. COUNCIL, CHALLENGES AND OPPORTUNITIES FOR NEW PUMPED STORAGE DEVELOPMENT 2-3 (2012), *available at* [http://www.hydro.org/wp-content/uploads/2014/01/NHA\\_PumpedStorage\\_071212b12.pdf](http://www.hydro.org/wp-content/uploads/2014/01/NHA_PumpedStorage_071212b12.pdf) [hereinafter CHALLENGES AND OPPORTUNITIES].

35. “Since 1990, global hydropower generation has increased by 50%.” INT'L ENERGY AGENCY, RENEWABLE ENERGY ESSENTIALS: HYDROPOWER 1 (2010), *available at* [http://www.iea.org/publications/freepublications/publication/Hydropower\\_Essentials.pdf](http://www.iea.org/publications/freepublications/publication/Hydropower_Essentials.pdf).

36. CH2MHILL, PREVENTION OF SIGNIFICANT DETERIORATION GREENHOUSE GAS PERMIT APPLICATION, at i (2012), *available at* <http://www.epa.gov/region6/6pd/air/pd-r/ghg/apex-matagorda-app.pdf>.

37. The first CAES plant, a 290 megawatt facility, was built in Huntorf, Germany in 1978. Thirteen years later, the 110 megawatt McIntosh CAES plant began operations in Alabama. The plants have a combined 50-year-plus lifetime. *Id.* at 5-11.

38. In Ohio, Norton Energy is proposing to use a limestone mine to store compressed air. In November 2009, Akron utility FirstEnergy bought the rights and plans to revive the development, which would be in an abandoned limestone mine in Norton, Ohio. *Haddington Sells Rights to its Norton Energy Storage Project to FirstEnergy*, PR NEWswire (Nov. 23, 2009), <http://www.prnewswire.com/new-releases/haddington-sells-rights-to-its-norton-energy-storage-project-to-firstenergy-71572382.html>.

39. In Texas, Apex has recently received approval for a 350 million-dollar-plus Bethel Energy Center, slated to be a 319 MW facility. Scheduled to open in 2016, Bethel Energy Center will be the first CAES to use wind power to condense the air. Paul Stone, *Anderson County Getting Energy Center*, PALESTINE HERALD-PRESS (July 11, 2012), <http://palestineherald.com/local/x941521205/Anderson-County-getting-energy-center>; see also Apex Bethel Energy Center, APEX CAES, <http://www.apexcaes.com/project> (last visited June 14, 2014). In 2012, General Compression commissioned a two megawatts CAES facility to integrate a windfarm in Texas. *Texas Dispatchable Wind 1, LLC*, GENERALCOMPRESSION, <http://www.generalcompression.com/index.php/tdw1> (last visited June 14, 2014).

40. In late 2011, the Nebraska Public Power District announced that it planned to buy the rights to store compressed air in sandstone formations in the western part of that state. Dan Haugen, *Scrapped Iowa Project Leaves Energy Storage Lessons*, MIDWEST ENERGY NEWS, (Jan. 19, 2012) <http://www.midwestenergynews.com/2012/01/19/scrapped-iowa-project-leaves-energy-storage-lessons/>. However, Iowa Stored Energy Park, a cooperative in Iowa funded in part by the Department of Energy, was abandoned after data revealed that the geology would not properly support a compressed air storage facility. *Id.*

demonstration projects are even trying to break CAES free from its geological shackles by storing air in existing pipelines<sup>41</sup> and steel air storage tanks<sup>42</sup> instead of underground, an advance that would render CAES much more mobile.

Other storage generally takes three additional forms: (1) electrochemical (batteries), (2) mechanical (flywheels), and (3) thermal energy. Batteries can take many forms (Li-ion, NaS, NiCd, Metal Air, lead acid, liquid, etc.), each with their own strengths and weaknesses depending on whether they are evaluated based on energy, power, or dischargeability.<sup>43</sup> But many other types are racing to the commercial finish line. The primary limitations associated with batteries, however, are the costs and the size of the battery required to store a meaningful amount of electricity.<sup>44</sup> One of the world's largest battery storage facilities is operating in Fairbanks, Alaska. The Alaskan battery is larger than a football field, yet can only provide enough electricity for 12,000 residents for seven minutes.<sup>45</sup>

Efforts to develop smaller, more effective batteries are slowly taking hold. Duke Energy has installed a thirty-six MW advanced-lead acid battery at the Ntorees Wind Farm in Texas, connecting to Texas' grid operator, Electric Reliability Council of Texas (ERCOT).<sup>46</sup> AES Energy Storage owns and operates an eight MW lithium-ion battery plant in Johnson City that provides rapid frequency regulation services to New York's grid operator, New York Independent Service Operator (NYISO)<sup>47</sup> and the world's largest

41. *E.g.*, *SustainX Begins Startup of World's First Grid-Scale Isothermal Compressed Air Energy Storage System*, SUSTAINX (Sept. 11, 2013), <http://www.sustainx.com/e9c13ca1-134c-49e9-9031-036592c1b37a/about-us-news-events-detail.htm>.

42. *E.g.*, *Technology*, LIGHTSAIL ENERGY, <http://www.lightsail.com> (last visited June 14, 2014).

43. See U.S. DEPT OF ENERGY, GRID ENERGY STORAGE 17-20 (2013), available at <http://energy.gov/sites/prod/files/2013/12/f5/Grid%20Energy%20Storage%20December%202013.pdf>; see also ELEC. POWER RESEARCH INST., ELECTRICITY ENERGY STORAGE TECHNOLOGY OPTIONS (2010).

44. ABBAS A. AKHIL ET AL., SANDIA NAT'L LABS., DOE/EPRI 2013 ELECTRICITY STORAGE HANDBOOK IN COLLABORATION WITH NRECA app. E at 6 (2013), available at <http://www.sandia.gov/ess/publications/SAND2013-5131.pdf>.

45. See, e.g., Jon R. Luoma, *The Challenge for Green Energy: How to Store Excess Electricity*, YALE ENVIRONMENT 360 (July 13, 2009), [http://e360.yale.edu/feature/the\\_challenge\\_for\\_green\\_energy\\_how\\_to\\_store\\_excess\\_electricity/2170/](http://e360.yale.edu/feature/the_challenge_for_green_energy_how_to_store_excess_electricity/2170/).

46. Tina Casey, *North America's Largest Wind Energy Storage Facility Fires Up in Texas*, CLEAN TECHNICA (Jan. 24, 2013) <http://cleantechnica.com/2013/01/24/largest-wind-energy-storage-facility-in-u-s-fires-up-in-texas/>; *Duke Energy to Deploy Energy Storage Technology at Texas Wind Farm*, DUKE ENERGY (Apr. 14, 2011), <http://www.duke-energy.com/news/releases/2011041402.asp>.

47. Eric Bloom, *Energy Storage on the Grid in the New Year*, NAVIGANT RESEARCH BLOG (Jan. 11, 2011), <http://navigantresearch.com/blog/articles/energy-storage-on-the-grid-in-the-new-year>.

lithium-ion battery farm (thirty-two MW) in West Virginia.<sup>48</sup> Primus Power is on track to deliver EnergyPods™ to California's Modesto Irrigation District starting in 2014.<sup>49</sup> Xtreme Power deployed about seventy-eight MW of energy storage projects by the time this Article went to print, including several in Hawaii.<sup>50</sup> The financial press has ever-increasing numbers of press releases, with different institutions touting their respective breakthroughs on battery energy storage.<sup>51</sup> Similar discussions surround fuel cells, a technology that functions like batteries through electrochemical processes.<sup>52</sup> Battery storage is expanding on an international level as well, with Japan, India, and China coupling storage with telecommunications towers.<sup>53</sup>

Flywheels reflect yet another form of energy storage. Flywheels accelerate a rotor to a very high speed and maintain the energy in the system as rotational energy—energy that is available instantly when needed by slowing down the flywheel.<sup>54</sup> New York is home to the first flywheel storage plant. With help from the New York State Energy Research and Development Authority (NYSERDA), Beacon Power has developed a twenty MW flywheel energy storage plan in Stephentown, New York.<sup>55</sup> Although it has been successful in

48. Uclia Wong, *The World's Largest Lithium-Ion Battery Farm Comes Online*, FORBES (Oct. 27, 2011), <http://www.forbes.com/sites/uciliawang/2011/10/27/worlds-largest-lithium-ion-battery-farm/>.

49. See DEPT OF ENERGY, PRIMUS POWER CORP., WIND FIRING ENERGYFARM (Aug. 2013), [https://www.smartgrid.gov/sites/default/files/pdfs/project\\_desc/OE0000228\\_Fact%2520Sheet\\_Primus%2520Jul2013\\_3.0%5B1%5D.pdf](https://www.smartgrid.gov/sites/default/files/pdfs/project_desc/OE0000228_Fact%2520Sheet_Primus%2520Jul2013_3.0%5B1%5D.pdf); Tom Stepien, Primus Power, Wind Firing EnergyFarm (Sept. 25, 2012) (PowerPoint presentation), available at <http://energy.gov/sites/prod/files/ESS%202012%20Peer%20Review%20-%20Wind%20Firing%20EnergyFarm%20-%20Tom%20Stepien%2C%20Primus%20Power.pdf>.

50. See *Proven & Flexible Storage Solutions: Experience*, XTREME POWER, <http://www.xtremepower.com/advantage/experience> (last visited June 14, 2014).

51. See, e.g., Luoma, *supra* note 45 ("Early this year, IBM revealed that it was launching a major research program into what looks like an even more promising technology—the lithium metal-air battery. Last month, a company called PolyPlus announced that it had already succeeded in developing one."); Kevin Bullis, *TR10: Liquid Battery*, MIT TECHNOLOGY REV. (Mar./Apr. 2009), <http://www2.technologyreview.com/article/412190/tr10-liquid-battery/> (MIT suggesting that liquid batteries are going to make it to commercialization first). Bill Gates invested in Aquion, a new environmentally sound battery made with saltwater instead of lithium that can create environmental disposal problems. Andrew Herndon, *Bill Gates Invests in Battery Maker Aquion Energy*, BLOOMBERG (Apr. 2, 2013), <http://www.bloomberg.com/news/2013-04-02/bill-gates-invests-in-battery-maker-aquion-energy.html>.

52. Haugen, *supra* note 40 (proposing a technology that would convert excess wind energy at night to hydrogen used in a fuel cell).

53. U.S. DEPT OF ENERGY, *supra* note 43, at 13-14.

54. *Technology*, BEACON POWER, [http://beaconpower.com/?page\\_id=103](http://beaconpower.com/?page_id=103) (last visited June 14, 2014).

55. Bradford P. Roberts, *Energy Storage Solutions*, PUB. UTIL. FORTNIGHTLY, May 2012, at 46, 49-50, available at <http://www.fortnightly.com/fortnightly/2012/05/energy-storage-solutions>; Matt Lazarewicz & Judith Judson, *Performance of First 20 MW*

providing frequency regulation to New York's grid and "[i]ts performance has influenced both regulatory and legislative initiatives,"<sup>56</sup> Beacon Power recently filed for Chapter 11 bankruptcy and needed to be restructured to continue development.<sup>57</sup>

A last form of energy storage, generally not used for bulk system storage, is thermal energy storage. A common thermal energy storage system "chills a storage medium [usually water, ice, or a phase-change material] during periods of low cooling demand and then uses the stored cooling later to meet air-conditioning load or process cooling loads."<sup>58</sup> California, for instance, recently began installing fifty-three MW in distributed ice storage across rooftops.<sup>59</sup> Although it is unclear which form of "new generation" energy storage will ultimately prevail for widespread commercialization, it is becoming clear that some form of energy storage is on the horizon.

### B. Value of Energy Storage

Energy storage has varied benefits, depending on its type and purpose.<sup>60</sup> Many types of energy storage are able to provide multiple services, and therefore yield multiple benefits.<sup>61</sup> A productive economy requires significant amounts of electricity, and demand is

*Commercial Flywheel Frequency Regulation Plant*, BEACONPOWER (June 7, 2011), [http://www.beaconpower.com/files/Beacon\\_Power\\_presentation\\_ESA%206\\_7\\_11\\_FINAL.pdf](http://www.beaconpower.com/files/Beacon_Power_presentation_ESA%206_7_11_FINAL.pdf).

56. Roberts, *supra* note 55, at 50.

57. Jeff Postelwait, *Beacon Power Emerges From Bankruptcy With New Energy Storage Project*, ELEC. LIGHT & POWER (June 24, 2013), <http://www.elp.com/articles/2013/06/beacon-power-emerges-from-bankruptcy-with-new-energy-storage-project.html> (noting the company was acquired by Rockland Capital, which assumed 25 million dollars of its outstanding DOE-guaranteed load plus provided additional cash and equity to finance a second flywheel plant).

58. PUB. INT. ENERGY RESEARCH PROGRAM, 2020 STRATEGIC ANALYSIS OF ENERGY IN CALIFORNIA 58 (2011), available at <http://www.energy.ca.gov/2011publications/CEC-500-2011-047/CEC-500-2011-047.pdf>.

59. *Ice Energy Project*, S. CAL. PUB. POWER AUTH., [http://www.scppa.org/pages/projects/ice\\_energy.html](http://www.scppa.org/pages/projects/ice_energy.html) (last visited June 14, 2014).

60. ELEC. ADVISORY COMM., 2012 STORAGE REPORT: PROGRESS AND PROSPECTS RECOMMENDATIONS FOR THE U.S. DEPARTMENT OF ENERGY 13 (2012) (These benefits can be felt in different degrees by various actors in the energy regime. The ISO/RTO transmission operators can benefit from energy storage through a number of mechanisms: ancillary services, real time energy balancing, energy price arbitrage, and resource adequacy. Generators can use it for intermittent resource integration for wind and solar, and supply firming. Transmission/Distribution can use it for peak shaving, to defer upgrade, provide relief from congestions, and transmission operation. End users/customers can use it for outage mitigation in microgrids, time of use energy management, power quality, and back-up power.).

61. One of the main benefits of energy storage is its ability to provide multiple services, including load leveling (and associated benefits such as a reduction in cycling-induced maintenance) along with regulation and contingency reserves and firm capacity. DENHOLM ET AL., *supra* note 15; see Strifling, *supra* note 28.

only projected to increase in the future.<sup>62</sup> Nearly every modern convenience—like computers, cell phones, machinery, and lights—is at the mercy of adequate electricity flows. The energy demand (or load) becomes even greater in the summertime, when air conditioning units in at least half of the country are running full-time. Although the market and regulators are still coming to grips with how to properly quantify these values without double-counting, investors should take confidence in the government's recognition of the four primary categories of energy storage benefits involving resource adequacy planning, adapting to changing public policy goals, and continuing to provide safe and cost-effective electricity: (1) reliability, (2) lower costs, (3) efficient production, and (4) environmental benefits.<sup>63</sup>

### 1. Reliability

A first benefit of energy storage is its ability to enhance the reliability of the grid. These reliability benefits can come in the form of backup electricity in times of power outages, enhanced power quality to prevent outages, and frequency regulation that adjusts for differences between grid operators' predictions and actual demand.

*Backup Electricity.* The concept of backup electricity is far from novel. Hospitals and other emergency service providers have been relying on back-up generators for many years.<sup>64</sup> Santa Rita jail in California, one of the largest inmate facilities, has taken steps to insulate itself from the risk of power outages by being one of the first microgrids capable of isolating itself from the traditional grid, in

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62. The Energy Information Administration estimates a twenty-nine percent increase in electricity demand by 2040 (to 4954 billion kilowatthours). U.S. ENERGY INFO ADMIN, ANNUAL ENERGY OUTLOOK 2014 MT-16 (2014), available at [http://www.eia.gov/forecasts/aeo/pdf/0383\(2014\).pdf](http://www.eia.gov/forecasts/aeo/pdf/0383(2014).pdf).

63. "In its 2009 Smart Grid Policy proposed policy statement, the FERC justified giving energy storage a high priority in smart grid standards development and cost recovery, based in large part on the benefits energy storage affords in integrating what the FERC termed 'unprecedented' amounts of variable generation resources. It pointed to the ability of energy storage to address three issues it saw attending large amounts of variable generation on the grid: resource adequacy concerns (the loss of variable generation during peak periods or critical times), resource management (the potential for over-generation during off-peak, low-load periods), and system stability concerns (that occur when there is high penetration of variable resources with low inertia properties). The FERC also noted the potential for energy storage to optimize bulk power production and facilitate power system balancing, among other benefits." Margaret Caffey et al., *Report of the Renewable Energy Committee*, 32 ENERGY L.J. 405, 427-29 (2011) (citing Smart Grid Policy, 126 FERC ¶ 61,253, ¶¶ 18-20 (Mar. 19, 2009)); see also ELEC. ADVISORY COMM., *supra* note 60.

64. Will Gruver, *Diesel Power Generators for Hospitals and Prisons*, US POWER & ENV'T (2007), [http://www.uspowerco.com/articles/diesel\\_power\\_generators\\_for\\_hospitals\\_and\\_pri](http://www.uspowerco.com/articles/diesel_power_generators_for_hospitals_and_pri).

part based on the energy storage onsite.<sup>65</sup> This type of distributed storage also is particularly useful in times of power outages due to weather-related disruptions, which are often sporadic and short-lived. For instance, Hurricane Sandy provided a platform for a few energy storage facilities operating in New York to demonstrate their success.<sup>66</sup>

*Power Quality.* Energy storage also can assist in a general class of services referred to as power quality and system stability. The National Renewable Energy Laboratories describes it well:

Power quality refers to voltage spikes, sags, momentary outages, and harmonics. Storage devices are often used at customer load sites to buffer sensitive equipment against power quality issues. Electric power systems also can experience oscillations of frequency and voltage. Unless damped, these disturbances can limit the ability of utilities to transmit power and affect the stability and reliability of the entire system. System stability requires response times of less than a second, and can be met by a variety of devices including fast-responding energy storage.<sup>67</sup>

*Frequency Regulation.* Grid operator projections of supply and demand do not always mirror reality. In fact, most days require some last-minute injections or withdrawals to correct for the gaps between supply and demand. "Frequency regulation service is the injection or withdrawal of real power by facilities capable of responding appropriately to a transmission system's frequency deviations or interchange power imbalance . . . ."<sup>68</sup>

Maintaining the frequency of the transmission system within an acceptable range is critical to reliable operations. When generation dispatch does not equal actual load and losses on a moment-by-moment basis, the imbalance will result in the grid's frequency deviating from the standard (sixty Hertz). Minor frequency deviations affect energy consuming devices; major deviations cause generation and transmission equipment to separate from the grid, in the worst case leading to a cascading blackout.

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65. Melissa C. Lott, *California Jail Transformed into Modern Microgrid*, SCIENTIFIC AMERICAN (June 19, 2012), <http://blogs.scientificamerican.com/plugged-in/2012/06/19/california-jail-transforms-into-modern-microgrid/>.

66. Michael Roach, *Hurricane Sandy & the Emperor's New Clothes: Microgrids as a Risk Mitigation Strategy for Extreme Weather Events*, MICROGRID HORIZONS 1, 13-14 (Dec. 13, 2012), [http://mseia.net/site/wp-content/uploads/2012/05/Roach\\_HurricaneSandyandtheEmperorsNewClothes\\_2012\\_wRefs.doc](http://mseia.net/site/wp-content/uploads/2012/05/Roach_HurricaneSandyandtheEmperorsNewClothes_2012_wRefs.doc).

67. DENHOLM ET AL., *supra* note 15, at 13.

68. Frequency Regulation Compensation in the Organized Wholesale Power Markets, Order No. 755, 137 FERC ¶ 61,064, ¶ 4 (Oct. 20, 2011) [hereinafter FERC Order No. 755].



“Frequency regulation service can help to prevent these adverse consequences by rapidly correcting deviations in the transmission system’s frequency to bring it within an acceptable range.”<sup>69</sup> Although fossil fuel generators have traditionally been used to regulate or correct frequency deviations, energy storage can join other emerging technologies like demand response to help provide this service.<sup>70</sup> The faster a resource can ramp up or down,<sup>71</sup> the more accurately it can respond to the correction signal, which places these emerging technologies at a distinct technological advantage over fossil fuel generators.<sup>72</sup>

## 2. Lower Costs

A second benefit of energy storage is its ability to reduce electricity prices. Electricity prices vary depending on its time of use, and prices are generally highest during “on-peak” periods, when the majority of our population is awake and “plugged in.”<sup>73</sup> Where energy storage can reduce the amount of peak electricity needed, costs are projected to decrease.<sup>74</sup> Although these on-peak periods represent only a small proportion of the total time electricity is needed, resource planners cannot base their decisions on the average load. Instead, energy resources are developed based on the peak loads. Generation, transmission, and distribution systems also must be sized for peak demand; as demand grows, new systems (both lines and substations) must be installed, often only to meet the peak demand for a few hours per year. Without wide scale energy storage, these peak demands are addressed primarily through peaker power

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69. See *id.* at 67,261.

70. *Id.* (“Provision by other resources is emerging, as technologies develop and tariff and market rules [are appropriately] adapt[ed] to accommodate new resources. For example, the Texas Interconnection and MISO currently use controllable demand response in addition to generators to provide frequency regulation service.”).

71. “‘Ramping’ or the ability to ‘ramp’ is traditionally defined as the ability to change the output of real power from a generating unit per some unit of time, usually measured as megawatts per minute (MW/minute). A generator ramps up to produce more energy and ramps down to produce less. A storage device ramps up by discharging energy and ramps down by charging.” *Id.* at 67,260 n.3.

72. *Id.* at 67,265. But see discussion *infra* Part III.2.b. FERC has noted that current compensation for frequency regulation services is inadequate to accommodate these new resources like energy storage. Under the current compensation rules, slow-ramping and fast-ramping resources are provided the same amount.

73. See, e.g., *On-Peak & Off-Peak Hours*, PACIFIC POWER, <http://www.pacificpower.net/ya/po/otou/ooh.html> (last visited June 14, 2014).

74. Judith Judson McQueeney, Chair of the ESA Advocacy Council, Statement of the Electricity Storage Association before the Federal Energy Regulatory Comm’n 2 (Sept. 11, 2013), available at <http://www.ferc.gov/CalendarFiles/20130911144647-Judson%20Comments.pdf>.

plants. Peaker plants are those generators that are able to ramp up and down rapidly to respond to a need from the grid operator. Furthermore, peaker plants also bring with them significant capital cost requirements, additional emissions, and usually a need to construct additional transmission lines to connect to the existing grid. Instead of building additional generation to satisfy peak loads, energy can be generated and stored during off-peak periods and discharged during peak periods to satisfy increased load.

In addition to ensuring adequate on-peak resources and reducing or eliminating the need for peaking facilities, this type of action also could reduce the need to construct additional transmission and distribution lines.<sup>75</sup> New lines may be difficult or expensive to build, often involving high capital costs and generating significant siting controversy. These expenses and controversies can be avoided or deferred by deploying energy storage located near the load.<sup>76</sup> Bringing the energy storage closer to the source also may alleviate the high line-loss rates that occur during peak demand.<sup>77</sup> Energy storage may be able to reduce or eliminate some of these costs, reducing rates for consumers. "Storage improves system efficiency and return on investment (ROI) by shifting peak load to off-peak hours and potentially reducing new investment in transmission infrastructure – if the storage is properly located with respect to transmission system constraints."<sup>78</sup>

### 3. Efficiency

A third benefit of energy storage lies in its ability to address potential over-generation during off-peak periods. Under the current constraints requiring instantaneous electricity use, significant amounts of electricity are wasted. This waste occurs for a number of reasons, including the generation of electricity during off-peak hours without demand to satisfy the supply and constraints along transmission lines. Renewable resources like wind, for instance, are

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75. Michael Kanellos, *Is Energy Storage a Product or Service*, GREENTECH MEDIA (Mar. 8, 2010), <http://www.greentechmedia.com/articles/read/is-energy-storage-a-product-or-service> ("A 1.2-megawatt sodium sulfur storage facility in West Virginia commissioned in 2006 trimmed peak power in the region by 10% to 15% and postponed the need to erect another plant . . .").

76. ALI NOURAI, SANDIA NAT'L LABS., *INSTALLATION OF THE FIRST DISTRIBUTED ENERGY STORAGE SYSTEM (DESS) AT AMERICAN ELECTRIC POWER (AEP): A STUDY FOR THE DOE ENERGY STORAGE SYSTEMS PROGRAM 13-14* (2007), available at [http://infoserve.sandia.gov/sand\\_doc/2007/073580.pdf](http://infoserve.sandia.gov/sand_doc/2007/073580.pdf).

77. DENHOLM ET AL., *supra* note 15, at 12 (citing Ali Nourai et al., *Load Leveling Reduces T&D Line Losses*, 23 IEEE TRANSACTIONS ON POWER DELIVERY 2168 (2008)).

78. DAN RASTLER, ELEC. POWER RESEARCH INST., *MISO ENERGY STORAGE STUDY PHASE I REPORT 3-1* (2011) [hereinafter MISO ENERGY STORAGE REPORT].

generally strongest during winter, off-peak hours. This disconnect between supply and demand can result in excess electricity that could be captured through energy storage.

For example, the Bonneville Power Association (BPA) has been faced with “too much of a good thing” with ample wind resources and water flows for hydropower. Its transmission lines can only transmit so much electricity, and this has forced the agency to choose between providing wind or hydropower to the grid. Were BPA to allow the excess water to spill over the dams, it would send hyper-oxygenated water into the Columbia River’s vital salmon runs, subjecting it to potential Clean Water Act violations.<sup>79</sup> Consequently, BPA agreed to supply the power obligations of their thermal generators without charge, a plan that was not as appealing to wind generators, who were not concerned with saving fuel costs and were instead concerned with generating wind to obtain the useful production tax credits (PTCs) and Renewable Energy Credits (RECs) associated with wind generation.<sup>80</sup> The dispute resulted in a FERC order requiring a new BPA curtailment protocol in which BPA agreed to compensate the wind generators for any PTC and unbundled RECs lost due to non-generation.<sup>81</sup>

Energy storage would have alleviated this problem, allowing for the electricity generated from both wind and hydropower to eventually make it to the grid. Additional energy storage would minimize the curtailment of renewable energy during these times of generator or transmission constraints, improve the capacity factors of generators, and reduce the pressure on minimum load requirements for conventional generators.<sup>82</sup> Similar efforts to enhance the efficiency of existing renewable generators can be seen in places like New Jersey, where the legislature has recently proposed funding cuts for renewables at the expense of increased funding for energy storage.<sup>83</sup>

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79. See *Iberdrola Renewables, Inc. v. Bonneville Power Admin.*, 137 FERC ¶ 61,185 (2011).

80. See *id.* at 4-5.

81. See Compliance Filing of the Bonneville Power Admin. at 26-27, *Iberdrola Renewables, Inc. v. Bonneville Power Admin.*, 137 FERC ¶ 61,185 (2011), No. EL11-44-000.

82. Fossil fuel plants indicate a level below which they cannot easily ramp down (often fifty percent). Renewable energy is therefore curtailed to prevent disruption of the efficiency of the fossil fuel plants. “One of the major conclusions of wind integration studies looking at higher penetrations is that minimum load points will need to be lowered substantially below their current annual minimums.” DENHOLM ET AL, *supra* note 15, at 27-28.

83. Jeff Spross, *New Jersey Wants to Boost Funding for Energy Storage Technology—Here are Some Options*, CLIMATEPROGRESS (Apr. 17, 2013, 11:00 AM), <http://thinkprogress.org/climate/2013/04/17/1879471/new-jersey-wants-to-boost-funding-for-energy-storage-technology-here-are-some-options/>.

#### 4. Environmental

A fourth benefit of energy storage is found in the reduced environmental impact that is realized by relying on more renewable energy to supply our nation's increasing electricity demand. Fossil fuel combustion is the number one contributor of our nation's greenhouse gas (GHG) emissions, as well as a number of other air pollutants.<sup>84</sup> Renewable energy by itself is not interchangeable with the baseload sources of fossil fuel energy like coal. Yet, by pairing energy storage with renewable energy, it firms the renewable energy generation, and may be able to displace some fossil fuel generators, as well as avoid their corresponding GHG and pollution emissions.<sup>85</sup> More precisely, it could displace polluting peaker plants and the ancillary services that are traditionally provided by fossil fuel generators.<sup>86</sup> "[L]arge-scale electricity storage promises [to] be an energy game-changer, unshackling alternative energy from the constraints of intermittence."<sup>87</sup>

The use of energy storage to provide energy services as opposed to traditional fossil fuel generation will also minimize the market risks associated with different primary fuel sources.<sup>88</sup> Natural gas looks quite attractive at the present time, with vast shale discoveries and

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84. EPA, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS, *supra* note 11, at ES-6 ("The primary greenhouse gas emitted by human activities in the United States was CO<sub>2</sub>, representing approximately 83.6 percent of total greenhouse gas emissions. The largest source of CO<sub>2</sub>, and of overall greenhouse gas emissions, was fossil fuel combustion.").

85. See, e.g., *Exelon Wind 1, L.L.C. v. Smitherman*, No. A-09-CA-917-SS, 2012 WL 4465607, at \*11 (W.D. Tex. Sept. 25, 2012) (noting the PUCT indicated that a wind-generated power could be made firm by the use of energy storage techniques); Benjamin K. Sovacool, *Running on Empty: The Electricity-Water Nexus and the U.S. Electric Utility Sector*, 30 ENERGY L.J. 11, 37 (2009) ("Furthermore, attaching wind turbines to pumped hydro and compressed air energy storage systems can improve their capacity factor to above seventy percent, making them 'functionally equivalent to a conventional baseload . . . plant.'" (citation omitted)).

86. McQueeney, *supra* note 74, at 3 ("[One] MW of storage has the potential to offset 2-4 MWs of traditional fossil generation providing frequency regulation."); Janice Lin & Giovanni Damato, *How Storage Can Help Get Rid of Peaker Plants*, GREENTECH MEDIA (June 28, 2010), <http://www.greentechmedia.com/articles/read/energy-storage-vs-peakers> ("[A]ssuming Pacific Gas and Electric's base load electric mix as the off-peak source of electricity, energy storage would provide 55% CO<sub>2</sub> savings, 85% NO<sub>x</sub> savings, and up to 96% savings of CO per MWh of on-peak electricity delivered."); see also LUONG, *supra* note 19, at 18 ("By using low-carbon energy storage, rather than resorting to flexible power generators, such as fast-ramping coal and gas plants, electricity-related carbon emissions are significantly reduced.").

87. Luoma, *supra* note 45.

88. When "frequency regulation" services are needed, grid operators traditionally turn to natural gas generators, capable of ramping up and down rapidly to regulate or correct frequency deviations. Natural gas prices exhibit significantly more price volatility than energy storage. See *Low Natural Gas Prices Drive Fuel Shifts in the Electric Power Sector*, BIPARTISAN POL'Y CTR. fig. 3 (June 15, 2012), <http://bipartisanpolicy.org/blog/2012/06/low-natural-gas-prices-drive-fuel-shifts-electric-power-sector>.

low natural gas prices. But an adjustment of our energy economy away from coal towards natural gas will result in a less diversified supply than presently exists, increasing the risk of supply disruptions due to future congestion in natural gas pipelines or price increases.

### C. *Regulatory Uncertainty Surrounding Energy Storage*

Despite these substantial benefits, energy storage still comprises a mere two percent of the energy generated in the United States.<sup>89</sup> As discussed above, although technical and financial uncertainty surely play a role, stakeholders repeatedly point to regulatory uncertainty as one of the primary barriers to energy storage's further deployment.<sup>90</sup> This section analyzes the primary regulatory uncertainty surrounding energy storage: FERC's approach to energy storage classification and the resulting inability of stakeholders to predict the future state of the regulatory environment.

These classifications are important, because much of energy law is premised on the labels provided to various energy transactions and assets. The two primary regulatory uncertainties associated with energy storage are (1) ambiguities about how to label the purchase and sale of electricity coming in and out of an energy storage device, resulting in jurisdictional uncertainty, and (2) ambiguities about how to label the energy storage assets, resulting in cost recovery uncertainty. The answers to these questions have substantial jurisdictional and cost recovery implications for developers, as is described below.

#### 1. *Jurisdictional Uncertainty*

A first type of uncertainty is whether sales of power into and out of an energy storage facility constitute wholesale or retail power. The Federal Power Act (FPA) provides FERC with jurisdiction over wholesale transactions but reserves the authority over retail transactions to the states. Wholesale transactions are sales for resale and would fall to FERC and competitive markets. Retail transactions are sales to an end user and would fall to the states, which use a mixture of regulated cost-of-service formulas and restructured markets.<sup>91</sup>

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89. U.S. DEPT OF ENERGY, *supra* note 43, at 4 ("[T]he U.S. has about 24.6 GW (approx. 2.3% of total electric production capacity) of grid storage, 95% of which is pumped storage hydro.").

90. *See supra* note 16.

91. *What Is a Wholesale Electricity Market?*, ELEC. POWER SUPPLY ASS'N, <http://www.epsa.org/industry/primer/?fa=wholesaleMarket> (last visited June 14, 2014).

FERC has consistently held that electricity coming in and out of pumped storage hydropower facilities constitutes a wholesale transaction that falls under FERC jurisdiction.<sup>92</sup> Similarly, the Texas Public Utility Commission (PUC) has been involved in a complicated jurisdictional question about whether the purchase and sale of electricity coming in and out of an energy storage facility should be treated as wholesale or retail transactions. Although Texas law would have treated the electricity charged and discharged from an energy storage facility as a retail sale, the Texas PUC made a special amendment to their rules that allowed a large-scale battery storage facility to pay wholesale rates when using electricity off the grid.<sup>93</sup>

It is likely that there is not one answer to this uncertainty, given that the answer depends where the facility is located and who is managing it. For instance, the answer would differ depending on whether it is a merchant generator or an Exempt Wholesale Generator (EWG) selling into wholesale markets (wholesale transactions), or whether the energy storage facility is located with a utility for self-supply or supply directly to consumers (retail transactions).<sup>94</sup> As a result, energy storage might support both retail and wholesale markets, meaning it could be subject to both state and federal regulators. Characterization of energy storage as generation or transmission can even impact the ability to realize tax credits, as was demonstrated by a recent private IRS ruling that allows a wind farm to claim a thirty percent investment tax credit on energy

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92. FERC has previously rejected classifying energy storage as "station power," resulting in a wholesale classification subject to FERC jurisdiction. Station power is used for operating the electric equipment on the site of a generation facility or associated buildings, and a station power designation renders the electricity used for that purpose a retail transaction since the generating facility is then the end user. *PJM Interconnection, L.L.C.*, 132 FERC ¶ 61,203, slip op. at 2-3 (Sept. 3, 2010). FERC found that "[l]ike pumping energy and compression energy, the energy used to charge Energy Storage Resources will be stored for later delivery and not used for operating the electric equipment on the site of a generation facility or associated buildings as Station Power is used." *Id.* at 4.

93. *Project Number 39917*, DOE GLOBAL ENERGY STORAGE DATABASE, SANDIA NAT'L LABS., <http://www.energystorageexchange.org/policies/16> (last visited June 14, 2014) ("The Commission recognized that a distinction of wholesale electrical load for storage devices was reasonable where a storage device . . . takes power from the grid, converts it to potential energy, and at a more opportune time transforms this potential energy back into electric energy, which is returned to the grid . . . . Storage devices thus differ fundamentally from other loads because the power taken from the grid is not consumed . . . . In this respect, there is a clear distinction between storage assets and other types of load when taking energy from the grid."); see also Tex. Pub. Util. Comm'n, Order Adopting Amendments to § 25.192 and § 25.501 as Approved at the March 7, 2012 Open Meeting (Mar. 29, 2012), available at <http://www.puc.texas.gov/industry/projects/rules/39917/39917adt.pdf>.

94. See, e.g., Tex. Pub. Util. Comm'n, *supra* note 93, at 2-12 (debating classification of electricity sales as wholesale or retail depending upon the location and operator of the energy storage facility).

storage batteries in part because the device was not treated as transmission equipment for regulatory purposes.<sup>95</sup>

## 2. Cost Recovery Uncertainty

A second type of uncertainty surrounds the difficulties of classifying energy storage assets into a legal regime premised on three traditional categories of assets: (1) generation, (2) transmission, and (3) distribution. Traditional energy resources fit relatively neatly into only one of these three categories, but energy storage is a particularly sticky problem because of its ability to perform more than one of these traditional energy functions.<sup>96</sup> In fact, it can perform all three.<sup>97</sup> This causes regulators and developers uncertainty about how the costs will be recovered, whether all of the value streams associated with energy storage will be able to be realized, and how to prevent double-counting associated with the cost recovery for energy storage. The most notable source of contention is whether energy storage constitutes a generation or a transmission asset. This section is not intended to argue for one or the other.<sup>98</sup> Instead, it analyzes the multi-functional nature of energy storage technologies and provides a flavor for the resulting cost recovery implications for these two classifications.

### (a) Energy Storage as Generation

In one sense, energy storage is a generator of electricity. Generation of electricity is defined as “[t]he process of producing electric energy by transforming other forms of energy.”<sup>99</sup> Most energy

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95. Chadbourne & Parke LLP, *Is the US Independent Generator Model Dead?*, PROJECT FIN. NEWSWIRE, Nov. 2011, at 1, 1 (discussing IRS Private Letter Ruling 201142005), available at [http://www.chadbourne.com/files/publication/d97f5fc1-1924-4ea6-90cd-48e96a8307f5/presentation/publicationattachment/6d7a694c-94c9-4e23-ae3a-4b411d00f682/PFNewsWire\\_Nov11.pdf](http://www.chadbourne.com/files/publication/d97f5fc1-1924-4ea6-90cd-48e96a8307f5/presentation/publicationattachment/6d7a694c-94c9-4e23-ae3a-4b411d00f682/PFNewsWire_Nov11.pdf).

96. It is not the first time that the same facility could fall under two different jurisdictions, depending on its function. *Report of the Judicial Review Committee*, 22 ENERGY L.J. 195, 206-07 (2001) (“The court affirmed the FERC’s two-pronged analysis of its jurisdiction over local distribution facilities: (1) if the facilities are used to effect a sale for resale in interstate commerce (wholesale sale), then the FERC has clear jurisdiction over them; and (2) if the facilities are used for unbundled retail sales (retail wheeling), then the FERC will use a seven-part functional test to determine whether the facilities are transmission facilities (subject to the FERC’s jurisdiction) or local distribution facilities (subject to state jurisdiction). The court held that the FERC’s two different statutory grants of jurisdiction (sales for resale v. transmission in interstate commerce) justify this differing treatment of what otherwise would be identical facilities.” (citing Transmission Access Policy Study Grp. v. FERC, 225 F.3d 667, 694 (D.C. Cir. 2000))).

97. *Id.* at 206-08.

98. For analyses of the competing classifications, see LUONG, *supra* note 19.

99. *Glossary*, U.S., ENERGY INFO. ADMIN., <http://www.eia.gov/cneaf/electricity/page/glossary.html#gh> (last visited June 14, 2014).

storage technologies are not actually storing electricity, but are storing the kinetic, potential, mechanical, or thermal energy and converting that energy back to electricity at a specified time. Technically, this process may be viewed as “generating” electricity.

The bulk storage of electricity, for example, if used by a utility to time-shift the generation of electricity from a time of low-cost generation, such as in the middle of the night, to a time of high-cost generation, such as during peak use, would be seen as similar to generation.<sup>100</sup>

This practice would allow for energy arbitrage, where entities can generate electricity when prices are low and hold the electricity until prices are high.<sup>101</sup>

On the other hand, some argue that an entity may only qualify as a generator if it is providing a net increase of electricity into the grid.<sup>102</sup> In this sense, energy storage facilities are merely converters of energy. Energy storage facilities use the energy from previously generated electricity to convert it back to electricity at a prescribed time. In so doing, they are providing no net increase in electricity onto the grid and therefore should not be treated as a generator.<sup>103</sup>

Many different types of energy storage have already earned the title of generation from FERC. The large, geographic-specific types of energy storage, pumped-storage hydropower and CAES, are treated as generation.<sup>104</sup> FERC defines a pumped storage hydropower facility as that which “stores and generates electricity” and regularly treats it as such.<sup>105</sup> FERC has even denied a pumped hydro storage developer’s request to include their costs in transmission rates, pointing out it would be discriminatory to roll the costs into transmission rates when other pumped storage hydro owners

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100. U.S. DEP’T OF ENERGY, DRAFT “ENERGY ADVISORY COMMITTEE” – ENERGY STORAGE SUBCOMMITTEE REPORT, at 2-1 (2008), available at [http://energy.gov/sites/prod/files/oeprod/DocumentsandMedia/EAC\\_-\\_Storage\\_Subcommittee\\_9-22-08\\_rev\\_1.pdf](http://energy.gov/sites/prod/files/oeprod/DocumentsandMedia/EAC_-_Storage_Subcommittee_9-22-08_rev_1.pdf).

101. M. KINTNER-MEYER ET AL., PAC. NW. NAT’L LAB., NATIONAL ASSESSMENT OF ENERGY STORAGE FOR GRID BALANCING AND ARBITRAGE: PHASE 1, WECC, at 7.1 (2012), available at [http://energyenvironment.pnnl.gov/pdf/PNNL-21388\\_National\\_Assessment\\_Storage\\_Phase\\_1\\_final.pdf](http://energyenvironment.pnnl.gov/pdf/PNNL-21388_National_Assessment_Storage_Phase_1_final.pdf).

102. Tex. Pub. Util. Comm’n, *supra* note 93, at 5-6.

103. In fact, there may even be a net loss of energy, as some forms of energy storage are quite inefficient. See, e.g., *Pumped Storage Provides Grid Reliability Even with Net Loss*, *supra* note 15.

104. *Pumped Storage Projects*, FED. ENERGY REG. COMM’N, <http://www.ferc.gov/industries/hydropower/gen-info/licensing/pump-storage.asp> (last updated Feb. 3, 2014); CAES, POWERSOUTH ENERGY COOPERATIVE, [http://www.powersouth.com/mcintosh\\_power\\_plant/compressed\\_air\\_energy](http://www.powersouth.com/mcintosh_power_plant/compressed_air_energy) (last visited June 14, 2014).

105. *Pumped Storage Projects*, *supra* note 104; see also Norton Energy Storage, L.L.C., 95 FERC ¶ 61,476, at 5-6 (2001).



collected revenues as other forms of generation—only by succeeding in the wholesale power markets.<sup>106</sup>

Some state regulators have also embraced energy storage as generation. New York is treating a proposed CAES facility as a “generation facility.”<sup>107</sup> The Seneca Compressed Air Energy Storage Project would be linked with a 115 kilovolts (kV) transmission system, which currently serves generators powered by fossil fuels, small hydro, and wind farms.<sup>108</sup> CAES is regularly referred to as a generator, including in scholarly treatises<sup>109</sup> and patents filed with the U.S. Patent Office.<sup>110</sup> Texas similarly treats CAES as generation but has also extended the generation logic to smaller-scale energy storage. In 2011, it passed a landmark bill that defines energy storage, including batteries and flywheels, as generation when offering services on the competitive market employed in that state.<sup>111</sup>

In further support of energy storage as generation, many states that have passed renewable portfolio standards (RPS), which require utilities to procure a certain amount of their electricity generation from renewables, also include energy storage as an eligible “source.”<sup>112</sup> Many of these RPS only allow energy storage to be used if

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106. Nevada Hydro Co., 122 FERC ¶ 61,272, at 32-33 (2008).

107. See WORLEYPARSONS, NEW YORK STATE ELECTRIC AND GAS: SENECA COMPRESSED AIR ENERGY STORAGE PROJECT – TRANSMISSION IMPACT STUDY 1 (2011).

108. *Id.*

109. Saifur Rahman, *Advanced Technology*, in ELECTRIC POWER GENERATION, TRANSMISSION, AND DISTRIBUTION 3.2 (2012) (“[C]ompressed gas is combusted in the turbine to produce electricity . . . and then operate[s] as a generator.”); Laurence D. Kirsch, *Compensating Electrical Storage Resources*, ELEC. J., May 2011, at 72, 73.

110. U.S. Patent No. 20110094212 A1, at [0003] (filed Oct. 28, 2009) (“In this scheme, the [CAES system] functions as a generator, providing power to a power grid, for example.”).

111. Tex. Bus. & Com. Bill Analysis, S.B. 943, 82nd Leg., Reg. Sess. (Tex. 2011), available at <http://www.capitol.state.tx.us/tlodocs/82R/analysis/html/SB00943F.htm>.

112. ASHLEY JOHNSON, NAT’L HYDROPOWER ASS’N, STATE RENEWABLE PORTFOLIO STANDARD REPORT 53 (2011) (noting Pennsylvania allows pumped hydro); CINDY LASH, KANSAS LEGISLATOR BRIEFING BOOK 2013: ENERGY AND UTILITIES 1, 2 (2013) (noting Kansas allows compressed air energy storage); Beacon Power, Response to the New York Energy Highway Request for Information (RFI) 7-8 (May 30, 2012) (noting New York classifies energy storage as “alternative energy production,” and is considering adding flywheels to its list of energy storage devices eligible for inclusion in the RPS); *Montana Incentives/Policies for Renewables & Efficiency*, DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, [http://www.dsireusa.org/incentives/incentive.cfm?Incentive\\_Code=MT11R](http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=MT11R) (last updated July 24, 2013) (noting Montana allows compressed air energy storage); *Ohio Incentives/Policies for Renewables & Efficiency*, DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, [http://www.dsireusa.org/incentives/incentive.cfm?Incentive\\_Code=OH14R](http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=OH14R) (last updated Nov. 8, 2012) (noting Ohio Senate Bill 221 would categorize storage that improves utilization of renewable resources during off-peak hours as a “Renewable Energy Resource”); Clean Energy States Alliance (CESA), Energy Storage in State RPSs (Dec. 19, 2011) (Webinar presentation), [http://www.sandia.gov/ess/docs/conferences/Dec\\_19\\_RPS\\_and\\_Energy\\_Storage\\_Combined\\_](http://www.sandia.gov/ess/docs/conferences/Dec_19_RPS_and_Energy_Storage_Combined_)

the electricity input into the storage device originated from a renewable source.<sup>113</sup> In California, only pumped-storage hydroelectric (a traditional renewable source) and “fuel cells using a renewable fuel” qualify for the state’s RPS,<sup>114</sup> and some local districts, such as the Truckee Donner Public Utility District, require that energy storage projects be sourced from renewable generators.<sup>115</sup> Massachusetts’s RPS qualifies energy storage facilities only if they store “useful thermal energy,” or basically heat energy that would have otherwise been wasted in electricity generation, transmission, and distribution.<sup>116</sup> Utah has proposed allowing compressed air energy storage only if the electricity compressing the air was produced using a renewable source or with a renewable energy credit.<sup>117</sup> Hawaii’s limited energy storage integration excludes energy from fossil fuel facilities.<sup>118</sup> Finally, Michigan’s RPS includes energy generated by renewable sources that is kept for later transmission in a storage facility.<sup>119</sup>

The label of generator has both jurisdictional and cost recovery implications. First, as noted above, the Federal Power Act provides states with jurisdiction over “facilities used for the generation of electric energy.”<sup>120</sup> Being classified as a generator also allows the

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Slides.pdf (noting Delaware allows fuel cells). *But cf.* VA. CODE ANN. § 56-585.2 (2013) (“‘Renewable energy’ shall not include electricity generated from pumped storage, but shall include run-of-river generation from a combined pumped-storage and run-of-river facility.”).

113. This is consistent with FERC’s rejection of energy storage as a “Qualified Facility (QF)” under PURPA where there was no demonstration that the amount of power provided came from sufficient “renewable resources.” *Luz Dev. & Fin. Corp.*, 51 FERC ¶ 61,078, at 5 (1990). “[E]nergy storage facilities such as the proposed Luz battery system are a renewable resource for purposes of QF certification. However, such facilities are subject to the requirement that the energy input to the facility is itself biomass, waste, a renewable resource, a geothermal resource, or any combination thereof or a demonstration that any fossil fuel-fired input constitutes no more than 25 percent of the total energy input to the facility and such uses are consistent with those enumerated in section 3(17)(B) of the FPA.” *Id.* at 9-10.

114. CAL. ENERGY COMM’N, RENEWABLES PORTFOLIO STANDARD ELIGIBILITY 8 (4th ed. 2011).

115. TRUCKEE DONNER PUB. UTIL. DIST., RENEWABLE ENERGY RESOURCES PROCUREMENT PLAN 5 (2013).

116. 225 MASS. CODE REGS. 16.05(2) (2008).

117. S.B. 104, 58th Leg., Gen. Sess. (Utah 2010).

118. HAW. REV. STAT. § 269-91 (2003).

119. MICH. COMP. LAWS § 460.1001 (2008); MICH. COMP. LAWS § 460.1039(c) (2008); MUHSIN ABDURRAHMAN ET AL., ENERGY STORAGE AS A TRANSMISSION ASSET 4 (2012), available at <http://www.pjm.com/~media/markets-ops/advanced-tech-pilots/xtreme-power-storage-as-transmission.ashx>.

120. 16 U.S.C. § 824(b)(1) (2012). However, The Supreme Court has upheld FERC authority over generating facilities, so long as the regulated activity can be characterized as “the sale of power created by that facility.” Steven Ferrey, *Sustainable Energy, Environmental Policy, and States’ Rights: Discerning the Energy Future Through the Eye of*

energy storage facility to have the same status and benefits associated with facilitating interconnection with the grid.<sup>121</sup> Second, and perhaps more importantly, by designating energy storage as generation, the provider commits to participation in a complicated cost recovery regime.

At the wholesale level, FERC continues to foster competition and monitor generators and marketers that charge market-based rates to ensure that they do not have market power or engage in prohibited behavior.<sup>122</sup> Wholesale markets exhibit regional differences, with two-thirds of the country operated by sophisticated regional markets and one-third of the country operated by individual entities. Two-thirds of the country is operated by seven regional transmission operators or independent system operators (RTO-ISOs),<sup>123</sup> which operate highly organized wholesale markets in which the energy resources are bid and dispatched in hourly and daily auctions. Although the availability and rules applicable to these markets differs by the seven RTO-ISOs,<sup>124</sup> an energy storage facility will recoup its cost through bidding into one or more of the three relevant

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*the Dormant Commerce Clause*, 12 N.Y.U. ENVTL. L.J. 507, 615-16 (2004); *see also* *Miss. Power & Light Co. v. Miss. ex rel. Moore*, 487 U.S. 354, 382-83 (1988). Although section 201(b) of the FPA denies FERC jurisdiction “over facilities used for the generation of electric energy,” that provision does not necessarily prevent FERC from including costs relating to generating facilities in transmission rates, over which FERC indisputably has jurisdiction. 16 U.S.C. § 824(b)(1) (2012). This is so because this part of section 201(b) is modified by the phrase “except as specifically provided in this subchapter and subchapter III of this chapter.” *Id.* Given that section 201(a) grants FERC jurisdiction over “the transmission of electric energy in interstate commerce” and, therefore, over transmission rates, *Id.* § 824(a), FERC may exercise jurisdiction over generation facilities to the extent necessary to regulate interstate transmission.” *Id.*

121. *See* Roberts, *supra* note 49, at 46, 48-49.

122. *See* 16 U.S.C. § 824s(d) (2012). FERC also established rules that allowed for market-based prices to satisfy the “just and reasonable” standard that Congress had imposed upon it. *Id.*

123. The seven RTOs are CAISO, ERCOT, SPP, MISO, PJM, NYISO, and ISO-NE. *Regional Transmission Organizations (RTO)/Independent System Operators (ISO)*, FERC, <http://www.ferc.gov/industries/electric/indus-act/rto.asp> (last updated Apr. 2, 2014); *see also* *The Role of ISOs and RTOs*, IRC RTO/ISO COUNCIL, <http://www.isorto.org/about/Role> (last visited June 14, 2014) (RTOs and ISOs serve two-thirds of electricity consumers in the United States).

124. RTOs may distinguish the availability of various markets based on whether the energy storage technology can function in the long-term or the short-term. For instance, “MISO currently accommodates long-term storage resources in its markets in the form of pumped hydro storage (PHS).” MISO ENERGY STORAGE REPORT, *supra* note 78, at 1-2. “Short-term storage is accommodated as a regulating reserve resource in the MISO ancillary services market (ASM).” *Id.* at v. The Southwest Power Pool operates a market design that combines a day-ahead market with unit commitment and a co-optimized energy and ancillary services markets. *See About The Marketplace*, SW. POWER POOL, <http://www.spp.org/section.asp?pageid=143> (last visited June 14, 2014).

markets: (1) energy,<sup>125</sup> (2) capacity,<sup>126</sup> and (3) ancillary services.<sup>127</sup> In non-RTO jurisdictions, individual, non-regionalized transmission owners “base trades exclusively on bilateral sales negotiated directly between suppliers.”<sup>128</sup>

At the retail level, the United States is divided into a mixture of traditional cost-of service (regulated) jurisdictions and restructured (competitive) jurisdictions.<sup>129</sup> In cost-of-service jurisdictions, the utilities remain vertically integrated, meaning the utility owns the generation, transmission, and distribution facilities servicing the area. In these jurisdictions, a PUC approves the rates that utilities can charge their customers based on a rate base multiplied by a rate of return, then adding operation and maintenance costs, administrative and general expenses, depreciation, income and non-income taxes, minus revenue credits.<sup>130</sup> Due to the multiplier effect applied to the rate base, an important factor in such determinations is whether a particular asset would be included in the utility’s base rate, receiving the benefit of a multiplier effect, whether the costs can only be included as a pass-through charge without the multiplier effect, or whether only partial costs of the energy storage will be allowed.<sup>131</sup> Without such clarification, investors may be unwilling to invest as large an amount of up-front capital. In these areas, “the role of power markets is limited to wholesale purchases or sales of power,

125. Energy markets establish a market clearing price for the electricity that balances load and generation at designated points on the transmission system.

126. Capacity markets provide payments to generators to ensure that sufficient capacity is built and maintained to serve system peak loads. Three of the seven RTO/ISOs have functioning capacity markets (PJM, NYISO and ISO-NE).

127. Ancillary services are specialized energy and capacity services that allow the ISO to operate the transmission grid and to respond to unanticipated contingencies such as the loss of a generator or transmission line. *Glossary and Acronyms*, ISO NEW ENGLAND, <http://www.iso-ne.com/support/training/glossary/> (last visited June 14, 2014) (Ancillary markets facilitate transfer of those “services that support electricity transmission and reliable operations of the grid, such as load regulation, spinning reserve, non-spinning reserve, replacement reserve, and voltage support” and are only beginning to emerge as renewables gain traction in the markets). AM. PUB. POWER ASS’N, A BRIEF DESCRIPTION OF THE SIX REGIONAL TRANSMISSION ORGANIZATIONS (RTOS) 1 (2012) (In regions with operating RTOs or ISOs, “market participants buy and sell a variety of electricity products and services,” which has facilitated the creation of markets for electricity, capacity, and ancillary services).

128. ELEC. ENERGY MKT. COMPETITION TASK FORCE, REPORT TO CONGRESS ON COMPETITION IN WHOLESALE AND RETAIL MARKETS FOR ELECTRIC ENERGY 3 (n.d.), available at <http://www.ferc.gov/legal/fed-sta/ene-pol-act/epact-final-rpt.pdf>.

129. *Status of Electricity Restructuring by State*, U.S. ENERGY INFO. ADMIN. (Sept. 2010), <http://www.eia.gov/electricity/policies/restructuring/>.

130. FED. ENERGY REGULATORY COMM’N, *supra* note 18, at 6-7.

131. CAL. PUB. UTILS. COMM’N, ELECTRIC AND GAS UTILITY COST REPORT 10 (2012), available at <http://www.cpuc.ca.gov/NR/rdonlyres/1C5DC9A9-3440-43EA-9C61-065FAD1FD111/0/AB67CostReport201.pdf>.

which utilities undertake to supplement their cost-based generation activities. These wholesale power transactions contribute to but are generally not needed to allow regulated utilities to recover capacity-related costs.”<sup>132</sup>

In restructured regions where there is retail competition, however, utilities are no longer vertically integrated, and generating facilities need to operate on a “merchant” basis.<sup>133</sup> These generating facilities no longer recover costs through cost-of-service rates, but “through market-based (short- or long-term) bilateral contracts or spot market sales” in energy, ancillary, and capacity markets, where available.<sup>134</sup>

*(b) Energy Storage as Transmission*

In another sense, energy storage can be considered a transmission asset. Transmission assets aid in the reliability of the grid, provide voltage support, frequency regulation, and other load leveling functions.<sup>135</sup> As discussed *supra* in Part II.B, energy storage can be a critical asset for providing exactly these functions, leading some to argue that it should be classified as such. As with a generation label, a transmission label carries with it jurisdictional and cost recovery implications—namely FERC jurisdiction and recovery under FERC-approved rates.

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132. JOHANNES PFEIFENBERGER ET AL., A COMPARISON OF PJM’S RPM WITH ALTERNATIVE ENERGY AND CAPACITY MARKET DESIGNS 13 (2009), available at [http://www.brattle.com/system/publications/pdfs/000/004/859/original/A\\_Comparison\\_of\\_PJ\\_M's\\_RPM\\_with\\_Alt\\_Energy\\_and\\_Capacity\\_Mkt\\_Designs\\_Pfeifenberger\\_et\\_al\\_Sep\\_2009.pdf](http://www.brattle.com/system/publications/pdfs/000/004/859/original/A_Comparison_of_PJ_M's_RPM_with_Alt_Energy_and_Capacity_Mkt_Designs_Pfeifenberger_et_al_Sep_2009.pdf) ¶1379014789.

133. *Id.* In states that allow competition, the PUC still regulates distribution wires and oversees structured programs for competitive electric energy suppliers. REGULATORY ASSISTANCE PROJECT, ELECTRICITY REGULATION IN THE US: A GUIDE 27-28 (2011), available at [www.raponline.org/documents/download.id/](http://www.raponline.org/documents/download.id/). In addition, some restructured state programs require incumbent utilities to provide energy service at regulated rates to customers as a default provider. See, e.g., BARBARA R. ALEXANDER, THE TRANSITION TO RETAIL COMPETITION IN ENERGY MARKETS: HOW HAVE RESIDENTIAL CONSUMERS FARED? PART ONE: AN ANALYSIS OF RESIDENTIAL ENERGY MARKETS IN GEORGIA, MASSACHUSETTS, OHIO, NEW YORK AND TEXAS 30 (2002) (noting the retention of incumbent utilities as Default Service providers in Ohio’s retail electric restructuring program); see also BARBARA R. ALEXANDER, DEFAULT SERVICE FOR RETAIL ELECTRIC COMPETITION: CAN RESIDENTIAL AND LOW INCOME CUSTOMERS BE PROTECTED WHEN THE EXPERIMENT GOES AWRY? 3 (2002) (“[E]very state that has adopted electric restructuring has provided [Default Service]. . . . [It] is viewed as a regulated service . . . in every state and its price, and terms and conditions are subject to regulation by the state regulator of electric utilities.”).

134. PFEIFENBERGER, *supra* note 132, at 13.

135. ABDURRAHMAN ET AL., *supra* note 119, at 3; see also DHRUV BHATNAGAR & VERNE LOOSE, EVALUATING UTILITY PROCURED ELECTRIC ENERGY STORAGE RESOURCES: A PERSPECTIVE FOR STATE ELECTRIC UTILITY REGULATORS 25-27, 37 (2012), available at <http://www.sandia.gov/ess/publications/SAND2012-9422.pdf> (discussing the different definitions and classifications of energy storage and explaining that FERC assesses the classification of energy storage devices on a case-by-case basis).

Using its authority under the FPA, FERC had previously embarked on a series of rulemakings to realize the benefits of enhanced competition. It required unbundling of historically vertically integrated utilities into separate generation, transmission, and distribution facilities in restructured areas.<sup>136</sup> As discussed previously, FERC created wholesale markets for generators and only retained control over those aspects of the utility industry at risk of monopolistic behavior, namely transmission assets.<sup>137</sup> FERC established transmission tariffs that require open and non-discriminatory rates and service for all generators.<sup>138</sup> FERC tariffs determine how much money transmission system owners can earn from their transmission system, determine the structure of the transmission rates, and often determine who pays for upgrades to the transmission system.<sup>139</sup>

In 2005, Congress amended the FPA by adding § 219, directing FERC to develop incentive-based rate treatments for transmission “for the purpose of benefiting consumers by ensuring reliability and reducing the cost of delivered power by reducing transmission congestion.”<sup>140</sup> Congress also expressly made clear that energy storage was an “advanced transmission technology” eligible for incentive-based rate treatment, and directed FERC to encourage these technologies “as appropriate.”<sup>141</sup> The amendment defined an “advanced transmission technology” as that which “increases the

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136. Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Services by Public Utilities; Recovery of Stranded Costs by Public Utilities and Transmitting Utilities, Order No. 888, 75 FERC ¶ 61,080 (Apr. 24, 1996) [hereinafter FERC Order No. 888].

137. *Id.*; see also David B. Spence, *Can Law Manage Competitive Energy Markets?*, 93 CORNELL L. REV. 765, 774 (2008) (discussing the history of unbundling of U.S. electricity markets).

138. Preventing Undue Discrimination and Preference in Transmission Service, Order No. 890-C, 126 FERC ¶ 61,228 (Mar. 19, 2009) (This “Order on Rehearing and Clarification” codified FERC Order No. 890 and supplemented Order Nos. 888 and 889 in order to clarify “certain revisions to its regulations and the pro forma open-access transmission tariff, or OATT, adopted in Order Nos. 888 and 889 to ensure that transmission services are provided on a basis that is just, reasonable, and not unduly discriminatory” and to increase transparency in the rules applicable to planning and use of the transmission system.); see also FERC Order No. 888, *supra* note 136.

139. MATTHEW H. BROWN & RICHARD P. SEDANO, NAT’L COUNCIL ON ELEC. POLICY, ELECTRICITY TRANSMISSION: A PRIMER 55 (2004), available at <http://www.puc.nh.gov/Transmission%20Commission/Transmission%20Infrastructure/Appendix%20A.pdf>.

140. Energy Policy Act of 2005 § 219, 16 U.S.C. § 824s(a) (Supp. 2005).

141. Energy Policy Act of 2005 §§ 1223-24, 42 U.S.C. §§ 16422-23 (Supp. 2005) (including pumped hydro, compressed air, superconducting magnetic energy storage, flywheels, and batteries); Promoting Transmission Investment Through Pricing Reform, Order No. 679, 116 FERC ¶ 61,057 (July 20, 2006) [hereinafter FERC Order No. 679].

capacity, efficiency, or reliability of an existing or new transmission facility, including . . . energy storage devices.”<sup>142</sup>

FERC complied with this directive in 2006 with Order No. 679, which embraced a more flexible approach to transmission rates. It allows “any transmitting utility or electric utility transmitting electric energy in interstate commerce that joins a Transmission Organization” to be eligible for incentive-based rate treatments.<sup>143</sup> FERC stated:

Thus, for the Nation to be able to integrate the next generation of resources, we must encourage investors to take the risks associated with constructing large new transmission projects that can integrate new generation and otherwise reduce congestion and increase reliability. Our policies also must encourage all other needed transmission investments, whether they are regional or local, designed to improve reliability or to lower the delivered cost of power.<sup>144</sup>

Many types of energy storage qualify as “other needed transmission investments . . . designed to improve reliability or to lower the delivered cost of power.”<sup>145</sup> In its final rule on incentive-based rates, FERC expressly embraced advanced transmission technologies like energy storage as being “illustrative of the kinds of technologies that Congress sought to encourage . . . that may be employed and considered for incentive ratemaking treatment.”<sup>146</sup>

The label of an “advanced transmission technology” is far from dispositive as to its asset classification, however, as is evidenced from FERC’s treatment of a California pumped storage hydro facility.<sup>147</sup> Even though FERC acknowledged that the 500 MW Lake Elsinore Advance Pumped Storage (LEAPS) project was an “advanced transmission technolog[y]” under the 2005 Energy Policy

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142. 42 U.S.C. § 16422(a)(11) (Supp. 2005).

143. FERC Order No. 679, *supra* note 141, ¶ 4.

144. *Id.* ¶ 25.

145. *Id.*

146. *Id.* ¶ 290.

147. The other relevant analysis would be to determine whether the energy storage entity seeking to take advantage of these rate incentives is a public utility, a question that turns on whether the entity is selling electric energy. 16 U.S.C. § 796(22) (Supp. 2005) (The Federal Power Act defines an electric utility as “a person or State agency (including [any municipality]) that sells electric energy. The term ‘electric utility’ includes the Tennessee Valley Authority and each Federal power marketing administration.”). Although this may not be a substantial issue for many energy storage developers because utilities are developing many of them, it may be particularly relevant for merchant energy storage facilities seeking to compete on a level playing field with incumbent utilities.

Act (EPAct),<sup>148</sup> it declined to treat the facility as a transmission asset to be included in the CAISO Transmission Access Charge,<sup>149</sup> saying it cannot support treating LEAPS differently than existing, similar generating units.<sup>150</sup> But this Congressional amendment and subsequent FERC rulemakings mean that if energy storage is designated as transmission, it may be a FERC jurisdictional facility subject to transmission tariffs and eligible for market incentives.<sup>151</sup> A transmission designation will also involve it in critical forthcoming transmission planning required by FERC's recent Order No. 1000, which requires transmission providers to consider transmission needs driven by public policy requirements established by state or federal laws or regulations.<sup>152</sup> As will be discussed *infra*, some states are already including energy storage into such "public policy requirements."

Importantly, the label of transmission asset can also serve to limit the energy storage facility, both in terms of access to markets and ownership. First, if energy storage is treated as a transmission asset, market rules prohibit it from participating in wholesale energy and ancillary service markets, markets that have historically been served by generators to "maintain the independence of grid operators and avoid the potential for market manipulation, whether real or

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148. Nevada Hydro Co., Order on Rate Request, FERC Doc. Nos. ER06-278-000 to -004, at 12 (Nov. 17, 2006), available at <http://www.ferc.gov/whats-new/comm-meet/111606/E-5.pdf>.

149. *See id.*

150. *Id.* at 5-6. Complicating matters was the fact that developers proposed to retain ownership of the facility but cede operational control to the transmission operator (in this case CAISO) and rely primarily on transmission system rights provided through transmission tariffs for their compensation). *Id.* at 3. Many rejected this proposal as presenting a conflict of interest for the ISO that was charged with neutrality as grid operator, including CAISO and FERC. Nevada Hydro Co., Order on Rate Incentives and Compliance Filings, 122 FERC ¶ 61,272, ¶¶ 59-63 (2008). In these systems, the RTOs and ISOs do not own any of the generation or transmission assets, but develop the rules to administer the markets, decide which generators will run at what levels, provide the transmission services needed for transactions to occur, and run the billing systems for payments for power. ROBERT H. SCHULTE ET AL., LESSONS FROM IOWA: DEVELOPMENT OF A 270 MEGAWATT COMPRESSED AIR ENERGY STORAGE PROJECT IN MIDWEST INDEPENDENT SYSTEM OPERATOR: A STUDY FOR THE DOE ENERGY STORAGE SYSTEMS PROGRAM 79 (2012), available at <http://www.sandia.gov/ess/publications/120388.pdf>.

151. BROWN & SEDANO, *supra* note 139, at 53 ("If the transmission facilities fall under federal jurisdiction, [however,] the state commission generally must allow the utility to include its transmission costs in [its] rates.>").

152. Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, Order No. 1000, 136 FERC ¶ 61,051 (July 21, 2011) (requiring each public utility transmission provider to participate in a regional transmission planning process that produces a regional transmission plan) [hereinafter FERC Order No. 1000].



perceived.”<sup>153</sup> Second, this asset classification may also have implications for ownership of the energy storage facility. For instance, in restructured regimes, the law requires utilities to divest their generation from their transmission and distribution,<sup>154</sup> as is evidenced by ERCOT’s retail choice areas, where “a company cannot own both generation and transmission/distribution, except through separate affiliates under stringent code of conduct restrictions.”<sup>155</sup> The American Physical Society similarly concluded that “the ability of energy storage technologies to “cross traditional boundaries of generation, transmission and distribution . . . [p]aradoxically . . . could restrict its deployment [ ] due to the limitations placed on ownership.”<sup>156</sup>

Regulators are starting to make these classification determinations with respect to energy storage that performs only one function. For instance, both the Wisconsin and Texas PUCs have approved energy storage projects that serve transmission functions.<sup>157</sup> In both cases, the PUCs made sure to prohibit double-counting, allowing the provider to recover transmission rates, but not participate in wholesale markets.<sup>158</sup> Yet it is unclear how they will treat an energy storage facility that performs multiple functions. Energy storage developers may find themselves in a catch-22

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153. CHALLENGES AND OPPORTUNITIES, *supra* note 34, at 11-12 (“Furthermore, FERC requires market power studies to be performed when third parties provide ancillary services at market-based rates to transmission providers . . .”).

154. See Paul L. Joskow, *Transmission Policy in the United States*, 13 UTILS. POL. 95, 96 (2005).

155. ELIZABETH DREWS, REGULATORY DEVELOPMENTS AND IMPACTS INVOLVING ELECTRICITY STORAGE IN TEXAS 5 (2012).

156. AM. PHYSICAL SOC., CHALLENGES OF ELECTRICITY STORAGE TECHNOLOGIES 18 (2007).

157. See Roberts, *supra* note 55, at 48-49 (discussing the Rhinelander Loop and the Sodium-Sulfur battery installed in Presidio, Texas); ABDURRAHMAN ET AL., *supra* note 119, at 3. The Texas PUC approved its classification as a transmission asset subject to the company’s regulated cost of service transmission rates. Order Approving Application of Electric Transmission Texas, LLC for Regulatory Approvals Related to Installation of a Sodium Sulfur Battery at Presidio, Tex., No. 35944 (Tex. Pub. Util. Comm’n 2009) [hereinafter Order Approving Electric Transmission’s Application, available at [http://interchange.puc.state.tx.us/WebApp/Interchange/Documents/35994\\_114\\_613205.PDF](http://interchange.puc.state.tx.us/WebApp/Interchange/Documents/35994_114_613205.PDF); Application of Electric Transmission Texas, LLC for Regulatory Approvals Related to Installation of a Sodium Sulfur Battery at Presidio, Tex., No. 35994 (Tex. Pub. Util. Comm’n 2008), available at [http://interchange.puc.state.tx.us/WebApp/Interchange/Documents/35994\\_1\\_592495.PDF](http://interchange.puc.state.tx.us/WebApp/Interchange/Documents/35994_1_592495.PDF).

158. See Order Approving Electric Transmission’s Application, *supra* note 157, at 11 (stipulating that the battery storage project at issue was correctly classified as a transmission asset alone, and not a generating facility capable of competing in wholesale markets, because “the . . . battery is a reactive device” that “does not generate electric power by converting another source of energy . . . into electricity,” but rather its “source of energy is power from the electric grid from which it stores and to which it later discharges”).

situation, since policymakers argue that for energy storage to reach its full market potential, its multiple functions all along the value stream need to be recognized.<sup>159</sup> At the same time, employing multiple functions may generate more controversy and opposition to the project for fear of double-counting through both cost-based rate treatment and market-based rate treatment. The American Public Power Association, whose members are often wholesale customers of public utilities taking service under FERC-regulated wholesale and transmission rates, argued that storage projects “should not be able to recover their full costs of service through cost-based rates and then earn additional revenues through sales in other markets that are pocketed by project participants.”<sup>160</sup> Opponents also argue that improperly characterizing energy storage as transmission is a back-door attempt to socialize the fixed costs of generation.<sup>161</sup>

David Pomper has argued that FERC exercises jurisdiction over energy storage on the basis of its transmission services as opposed to wholesale transaction authority.<sup>162</sup> He subscribes to longstanding jurisprudence about the bounds of transmission services, describing transmission as extending from where generation is complete to where the energy is subdivided to serve ultimate consumers.<sup>163</sup> Under this interpretation, FERC would have jurisdiction over all the functions of energy storage, a result that might not occur if FERC exerted its jurisdiction based on whether the electricity entering or

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159. Dhruv Bhatnagar, Sandia Nat'l Labs., Regulatory Challenges to the Integration of Energy Storage 4 (2013) (Powerpoint presentation) (identifying “functional classification restrictions” (“[b]lurring of the line between [asset] classifications”) as a challenge to energy storage and suggesting that “clarity and transparency in procedures to allow revenue recovery under multiple classifications” could serve as a solution). Additionally, without an apples to apples costs and benefits comparison, an energy storage project may not look cost-effective next to a new peaking generation facility or transmission line.

160. Jeannine Anderson, *Rates to Pay for Energy Storage Devices Should Not Allow Cross-subsidization*, APPA tells FERC, PUB. POWER DAILY (Aug. 20, 2010) (internal quotation marks omitted), <http://www.naylor-network.com/app-ppd/articles/index-v2.asp?aid=124398&issueID=22651>. The American Public Power Association also argued that “[s]haring costs of energy storage facilities between retail and wholesale rates could open the door to cross-subsidization of a utility’s retail customers by its wholesale customers . . . .” *Id.*

161. See, e.g., Brief of The Nevada Hydro Company in Response to the Administrative Law Judge’s Ruling Establishing Date for Service of Supplemental Testimony and Setting Briefing Dates Dated October 6, 2010, Cal. Pub. Utils. Comm’n, App. No. 10-07-001, at 19 (Nov. 19, 2010), <http://fronlinesonline.files.wordpress.com/2011/05/tnhc-initial-brief-revised-december-11.pdf> (“The intervenor compensation program socializes the intervenor’s costs among the utility’s ratepayers.”); Nevada Hydro Co., Order on Rate Request, *supra* note 148, at 9.

162. David E. Pomper, *Pausing the Speed of Light: Rethinking the Basis for Federal Jurisdiction over Storage Services*, ELECTRICPOLICY.COM 7-8 (Oct. 11, 2011), [http://www.spiegel-mcd.com/files/Pomper\\_merged\\_2011\\_11\\_15\\_02\\_26\\_56.pdf](http://www.spiegel-mcd.com/files/Pomper_merged_2011_11_15_02_26_56.pdf).

163. *Id.* at 7.

exiting the storage facility is wholesale or retail.<sup>164</sup> Pomper also argues that the jurisdictional and cost recovery aspects are not necessarily linked, providing an example of jurisdictional transmission facilities that have their cost allocated to generation customers or markets.<sup>165</sup> In fact, Pomper goes as far as to argue that we should “recognize that storage is a form of transmission that, generally, should be regulated like generation.”<sup>166</sup>

In sum, cost recovery turns primarily on whether the energy storage facilities are labeled as generation, transmission, or distribution facilities. Generators are able to bid their electricity and sometimes their ancillary and capacity services into wholesale markets.<sup>167</sup> Transmission operators, however, are subject to FERC-regulated rates through established tariffs.<sup>168</sup> To further complicate matters, some energy storage developers would not want to be pigeon-holed into one asset category or the other. In fact, some forms of energy storage will only be cost-effective if they can realize all of the benefits that energy storage can provide, benefits that spread across all three of these asset categories.<sup>169</sup> For energy storage to maximize its value, however, it may be necessary for energy storage developers to seek cost recovery in both regulated cost-of-service and market-based regimes, subjecting it to both state and federal jurisdiction. The result can be both jurisdictional struggles of overlap and gaps, as well as risks of double-counting and inadequate compensation.

### III. CHARACTERIZING THE REGULATORY UNCERTAINTY

Significant organizational theory literature exploring regulatory uncertainty exists. These scholars have spent decades defining uncertainty,<sup>170</sup> differentiating various types of uncertainty,<sup>171</sup> and

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164. *Id.* at 8.

165. *Id.*

166. *Id.*

167. See, e.g., *Market Products and Services Help Meet Demand*, CAL. INDEP. SYS. OPERATOR, <http://www.caiso.com/market/Pages/ProductsServices/Default.aspx> (last visited June 14, 2014) (explaining that “[s]cheduling coordinators can offer energy into the market from generating units” and “may participate in the ancillary services market”).

168. REGULATORY ASSISTANCE PROJECT, *ELECTRICITY REGULATION IN THE US: A GUIDE* 67 (2011), available at [http://www.raonline.org/docs/RAP\\_Lazar\\_ElectricityRegulationInTheUS\\_Guide\\_2011\\_03.pdf](http://www.raonline.org/docs/RAP_Lazar_ElectricityRegulationInTheUS_Guide_2011_03.pdf).

169. See EYER & COREY, *supra* note 29, at 18-21 (listing out seventeen applications for energy storage).

170. See, e.g., Milliken, *supra* note 17, at 134, 136 (citing different definitions of “environmental uncertainty,” meaning external to the organization, not environmental of the natural world variety).

171. See, e.g., Hugh Courtney, Jane Kirkland & Patrick Viguerie, *Strategy Under Uncertainty*, HARVARD BUS. REV., Nov. 1997, at 67, 68-71 (differentiating based on four

assessing organizational strategic responses to such uncertainty.<sup>172</sup> Of these efforts, only a subset addresses regulatory uncertainty specifically, and few, if any, identify criteria that are helpful in distinguishing between the different degrees of regulatory uncertainty that exist.<sup>173</sup> This Part embarks on this mission—to begin a framework for characterizing different degrees (as opposed to types) of uncertainty. By degree, it means the relative state of the uncertainty, along a spectrum, that suggests that all regulatory uncertainty is not created equal. To do this, this Part uses the uncertainty associated with energy storage to identify factors that are important to assessing the degree of uncertainty.

Uncertainty runs the risk of alienating energy storage developers and impeding the deployment of the affected technologies.<sup>174</sup> The most common reaction to such uncertainty is one of risk avoidance. This is understandable, as predictability is one of the cornerstones of the rule of law, providing stability and certainty for the regulated community.<sup>175</sup> The risk averse nature of humans further contributes

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possible futures); Milliken, *supra* note 17, at 135-36 (differentiating perceived uncertainty into three types: state, effect, and response uncertainty); Birger Wernerfelt & Aneel Karnani, *Competitive Strategy Under Uncertainty*, 8 STRATEGIC MGMT. J. 187, 189 (1987) (differentiating based on demand structure, supply structure, and competitors and externalities).

172. Christian Engau & Volker H. Hoffmann, *Strategizing in an Unpredictable Climate: Exploring Corporate Strategies to Cope with Regulatory Uncertainty*, 44 LONG RANGE PLAN. 42 (2011); Volker H. Hoffmann et al., *Regulatory Uncertainty: A Reason to Postpone Investments? Not Necessarily*, 46 J. MGMT. STUD. 1227, 1227-29 (2009).

173. As Hoffman identifies, some scholars like Miles and Snow do distinguish between types of regulation (tax versus regulation, price setting versus product standards), but not to the level of detail at which this Article addresses uncertainty. Hoffmann et al., *supra* note 172, at 1237. Hoffman's differentiation may be one of the closer characterizations of degree than type. Volker H. Hoffmann et al., *A Taxonomy for Regulatory Uncertainty—Application to the European Emission Trading Scheme*, 11 ENVTL. SCI. & POL'Y 712, 712-13 (2008) (differentiating within one specific regulation based on basic direction, measures and rules, implementation process, and interdependence); Hoffmann et al., *supra* note 172, at 1237 (differentiating based on current implementation, medium-term measures and rules, and long-term political direction); see also Guy L.F. Holburn, *Assessing and Managing Regulatory Risk in Renewable Energy: Contrasts between Canada and the United States*, 45 ENERGY POL'Y 654 (2012) (focusing on regulatory risks as opposed to regulatory uncertainty, but arguing that regulatory risks are lower in jurisdictions where regulatory agencies have greater autonomy and rigid policy-making processes).

174. See, e.g., *AT&T Inc. v. FCC*, 452 F.3d 830, 836 (D.C. Cir. 2006) ("The Commission has noted on several occasions that regulatory uncertainty can discourage investment, and so unnecessary regulatory uncertainty should be avoided." (quoting *In re Amendment of the Comm'n's Space Station Licensing Rules & Policies*, 18 FCC Rcd. 10,760, 10,781 ¶ 45 n.115 (2003))).

175. See, e.g., Exec. Order No. 13563, 3 C.F.R. 13,563, 13,563 (2011) (Our regulatory system "must promote predictability and reduce uncertainty."); Kathryn A. Watts, *Regulatory Moratoria*, 61 DUKE L.J. 1883, 1922 (2012) ("[Nevada] Governor Sandoval asserted that 'stable, consistent and predictable common sense regulation is vital to

to a desire for certainty.<sup>176</sup> A wealth of literature supports the common sense notion that firms are less willing to invest where the returns are uncertain.<sup>177</sup> Firms that cannot accurately predict future regulatory conditions are naturally more hesitant to invest significant amounts of capital. As has been noted in judicial proceedings, "[t]he general proposition that uncertainty about regulatory requirements affects market value is so intuitively obvious as to require no expert support."<sup>178</sup> Such reluctance to invest also can stifle innovation.<sup>179</sup> "Regulatory uncertainty directly impacts innovation by hampering investment, and, therefore decreasing the amount of available capital that can be used for research and development."<sup>180</sup> Not surprisingly, therefore, uncertainty often is

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maintaining a regulatory environment that both secures the people and businesses of the state of Nevada and fosters economic growth.'" (citation omitted)).

176. Daniel A. Farber, *Uncertainty*, 99 GEO. L.J. 901, 908 (2011) ("People are often risk averse—that is, they prefer not to gamble."); Donald T. Hornstein, *Reclaiming Environmental Law: A Normative Critique of Comparative Risk Analysis*, 92 COLUM. L. REV. 562, 588 (1992) ("When substantial risk is involved, most people are risk averse: they tend to avoid gambles that pose the chance of catastrophic loss even when the chances of favorable outcomes are as great (or even greater) than the chances of catastrophic ones."); Diane Klein, *Distorted Reasoning: Gender, Risk-Aversion and Negligence Law*, 30 SUFFOLK U. L. REV. 629, 636 (1997) ("A person is risk-averse . . . if he strictly prefers a certainty consequence to any risky prospect whose mathematical expectation of consequences equals that certainty." (citation omitted)).

177. See, e.g., Aswath Damodaran, *Applied Corporate Finance: A User's Manual, Third Edition*, DAMODARAN ONLINE ch. 9, p. 17, [http://pages.stern.nyu.edu/~adamodar/New\\_Home\\_Page/ACF3E/appldCF3E.htm](http://pages.stern.nyu.edu/~adamodar/New_Home_Page/ACF3E/appldCF3E.htm) (last visited June 14, 2014) ("Since every risky investment or decision can potentially cause default, managers may hold back on committing to new investments that they perceive as uncertain.").

178. *Anatoli Rest., Inc. v. Dep't of Highways*, No. CIV.A.98-6220, 2001 WL 498960, at \*5 (Mass. Dist. Ct. Apr. 26, 2001); see also David E. Adelman & Kirsten H. Engel, *Reorienting State Climate Change Policies to Induce Technological Change*, 50 ARIZ. L. REV. 835, 854 (2008) ("The questionable credibility of government commitments to future levels of regulation diminishes the capacity of environmental regulations to induce companies to invest in long-term research and development.").

179. See, e.g., *Nat'l Res. Def. Council, Inc. v. U.S. Nuclear Regulatory Comm'n*, 685 F.2d 459, 543 n.167 (D.C. Cir. 1982), *rev'd sub nom. Baltimore Gas & Elec. Co. v. Nat'l Res. Def. Council, Inc.*, 462 U.S. 87 (1983) ("The impact of regulatory uncertainty on the incentive of public utilities to innovate has been well-chronicled."); Linda Cohen, *Innovation and Atomic Energy: Nuclear Power Regulation, 1966–Present*, 43 LAW & CONTEMP. PROBS. 67, 70-72 (1979) (time, expense, and uncertainty in acquiring NRC licenses are key factors inhibiting innovation); see also *City of Chicago v. AT&T Broadband, Inc.*, No. 02 C 7517, 2003 WL 1888839, at \*3 (N.D. Ill. Apr. 15, 2003) ("In order to facilitate our national policy goals, we seek to clarify the authority of State and local governments with respect to cable modem service . . . . [W]e seek to remove regulatory uncertainty that may discourage investment and innovation in broadband services . . . ." (citation omitted)); Jonathan H. Adler, *Eyes on a Climate Prize: Rewarding Energy Innovation to Achieve Climate Stabilization*, 35 HARV. ENVTL. L. REV. 1, 35-36 (2011).

180. R. Alex DuFour, *Voice over Internet Protocol: Ending Uncertainty and Promoting Innovation Through a Regulatory Framework*, 13 COMM.LAW CONSPPECTUS 471, 487 (2005).

repeatedly blamed for inaction on a variety of matters.<sup>181</sup> Energy storage is no exception.

In certain instances, blaming uncertainty for inaction is valid, particularly where the uncertainty reaches a degree where the scope of the uncertainty is paralyzing for both those internal and external to the situation and where eventual resolution is outside of the control of the stakeholders.<sup>182</sup> But in other circumstances, uncertainty appears to be an undeserving scapegoat for inaction.<sup>183</sup>

Given the uncertainty surrounding energy storage, it seems important to develop a framework for assessing the degree of the uncertainty and to apply this framework to energy storage. This part asserts that uncertainty is far from a singular concept. Instead, it encompasses a spectrum of activity with varying causes,

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181. See, e.g., Lyon & Li, *supra* note 19, at 2-3 (noting a number of examples of utilities decreasing price targets and declining investments due to regulatory uncertainty); Jess Davis, *Dallas' Inaction on Fracking Regs Driving Away Drillers*, LAW360 (Jan. 23, 2013, 5:07 PM), <http://www.law360.com/articles/408939/dallas-inaction-on-fracking-regs-driving-away-drillers> (describing how several exploration and production companies have withdrawn permit applications because of the city's delay in issuing fracking regulations); Patricia Fleischauer, *Regulatory Uncertainty Hindering Offshore Wind Development*, ELECTRIC LIGHT & POWER (Mar. 1, 2010), <http://www.elp.com/articles/print/volume-88/issue-2/sections/regulatory-uncertainty.html> (describing the various regulatory factors that have held back development of offshore wind resources); *U.S. RMBS Recovery Held Back by Regulatory Uncertainty*, FITCH RATINGS (June 26, 2012, 11:34 AM), [http://www.fitchratings.com/gws/en/fitchwire/fitchwirearticle/U.S.-RMBS-Recovery?pr\\_id=753601](http://www.fitchratings.com/gws/en/fitchwire/fitchwirearticle/U.S.-RMBS-Recovery?pr_id=753601) (“[U]ncertainty relating to aspects of the Dodd-Frank Act of 2010 has caused many traditional RMBS issuers to delay their issuance plans.”); Memorandum from Eric Cantor, Majority Leader of U.S. House of Representatives, to House Republicans, on Upcoming Jobs Agenda (Aug. 29, 2011), available at <http://majorityleader.gov/blog/2011/08/memo-on-upcoming-jobs-agenda.html> (characterizing regulatory uncertainty as a form of “costly bureaucratic handcuffs” that produce a job-killing “cloud” over employers).

182. See, e.g., Kira R. Fabrizio, *The Effect of Regulatory Uncertainty on Investment: Evidence from Renewable Energy Generation*, 29 J.L. ECON. & ORG. 765, 766 (2012) (finding that investment in new renewable generating assets in states with RPSs has been significantly lower in states with histories of regulatory repeal than those with no history of repealing restructuring legislation); Bill Frezza, *Regulatory Uncertainty Drives a Fish Farmer to Foreign Waters*, FORBES (Nov. 25, 2012, 5:55 PM), <http://www.forbes.com/sites/billfrezza/2012/11/25/regulatory-uncertainty-drives-a-fish-farmer-to-foreign-waters/> (chronicling a business owner's decision to move his offshore deep water fish farming business to Panama in order to avoid the confusion and stress of overlapping state and federal regulations that would apply to his business in the United States, none of which acknowledged a lead agency or authority); See also discussion of Cape Wind, *infra* note 257.

183. See, e.g., Sidney Shapiro, *The Regulatory Accountability Act of 2011: Way Too Much of a Good Thing*, ADMIN. & REG. L. NEWS, Spring 2012, at 10, 11 (citing studies that refute claims that regulatory uncertainty is holding back the economy); Kevin Drum, *Awkward Facts Kill the Regulatory Uncertainty Zombie*, MOTHER JONES (Oct. 2, 2011), <http://www.motherjones.com/kevin-drum/2011/10?page=16> (“Our problem is high debt levels and weak demand, not business-deadening regulations.”); Lawrence Mishel, *Regulatory Uncertainty: A Phony Explanation for Our Jobs Problem*, ECON. POL'Y INST. (Sept. 27, 2011), <http://www.epi.org/publication/regulatory-uncertainty-phony-explanation> (arguing that regulatory uncertainty is a poor explanation for the lack of jobs problem).

characteristics, and consequences. Implicit in this concept is an understanding that there are multiple varieties of uncertainty with differing degrees of impacts. Few examples of uncertainty are either “all bad” or “all good,” with most varieties reflecting some degree of both. An analysis of a specific variety of uncertainty will require a balancing of the drawbacks and virtues of that uncertainty in any specific situation.

To assist in categorizing uncertainty into places along a spectrum, this part identifies three variables critical to developing a useable framework for characterizing the different varieties of uncertainty: (1) the context surrounding the uncertainty, (2) the scope of the uncertainty, and (3) the source of the uncertainty, each of which is discussed below.<sup>184</sup> This part applies this framework to energy storage uncertainty and advances a more accepting notion of uncertainty when three factors are present. Uncertainty is less troubling when it is operating in the context of high baseline levels of uncertainty, when it is limited in scope, and when the power to resolve the uncertainty resides in discrete sources, particularly when a federal source has intentionally chosen to embrace it and allows states to act to fill the void.

#### A. Context for Energy Storage Uncertainty

The first relevant factor to consider when categorizing uncertainty is the context of other uncertainty surrounding it. As Professor Milliken has explained, “[U]ncertainty . . . is likely to be partially a function of the characteristics of the environment in which the organization is operating.”<sup>185</sup> Those organizations that function in a volatile and complex environment may perceive more uncertainty than those in simpler and more stable environments.<sup>186</sup> Instead of a blanket reason for inaction, whether a specific uncertainty is likely to result in inaction depends in part on how risky that endeavor looks compared to the expected future value of other outcomes. Where all the alternatives have questionable expected future value, the marginal difference may be less relevant than where the uncertainty of one alternative is compared against options with more certain

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184. “Some other elements of regulatory uncertainty that could be worth considering include: frequency of potential policy change (frequent or infrequent), type of compliance requirements (flexible/inflexible), and potential penalties for non-compliance (punitive or benign).” Adam R. Fremeth & Brian K. Richter, *Profiting from Environmental Regulatory Uncertainty: Integrated Strategies for Competitive Advantage*, 54 CALIF. MGMT. REV. 145, 163 n.5 (2011).

185. Milliken, *supra* note 17, at 137.

186. *Id.*

future value.<sup>187</sup> Therefore, the first parameter to be explored when trying to characterize uncertainty is the context within which that uncertainty operates.

In assessing context, this framework posits that uncertainty should be characterized through a comparison with a baseline level. Courts have acknowledged the importance of baseline levels of uncertainty in assessing elements of claims. For instance, in order to establish the element of causation, the plaintiff must show more than the existence of uncertainty after the taking; it must show that the 1998 taking, as distinct from those other events, brought about a measurable change in the level of uncertainty, so as to affect market value.<sup>188</sup>

Implicit in this assessment is an acceptance that uncertainty that exists against a high baseline level of uncertainty is not as troublesome as uncertainty amidst a relatively low baseline level of uncertainty.<sup>189</sup> It is also important to remember that regardless of risks that regulations can eliminate, “a great deal of exogenous” risk—risk outside of what regulations can eliminate—will always exist.”<sup>190</sup> For these reasons, context is important for making more realistic decisions about the proper response to the uncertainty.

The rest of this section assesses the uncertainty of energy storage against the baseline level of uncertainty surrounding the energy industry generally, with a specific focus on jurisdiction and cost recovery. It argues that these are two areas rife with high baseline

187. See, e.g., Warren G. Lavey, *Making and Keeping Regulatory Promises*, 55 FED. COMM. L.J. 1, 7 (2002) (discussing the investment choices industries face when confronted with regulatory uncertainty); see also Michael E. Sykuta, *The Nature of the Deal in the Post-Crisis Financial Market*, 7 OHIO ST. ENTREP. BUS. L.J. 27, 35-38, 43 (2012) (discussing several sources of uncertainty that can affect investment and the value of different business transactions in such situations).

188. *Anatoli Rest., Inc. v. Dep’t of Highways*, No. CIV.A.98-6220, 2001 WL 498960, at \*5 (Mass. Dist. Ct. Apr. 26, 2001) (rejecting claims because the regulatory uncertainty the plaintiffs faced failed to exceed the baseline level of regulatory uncertainty present before plaintiff began construction).

189. See, e.g., Nupur Chowdhury, *Common Market but Divergent Regulatory Practices: Exploring European Regulation and the Effect on Regulatory Uncertainty in the Marketing Authorization of Medical Products*, 35 J. EUR. INTEGRATION 635, 645 (2013) (comparing the regulatory uncertainty of pharmaceutical guidelines to that of the advanced therapy products and characterizing the level of uncertainty through comparison with a baseline level).

190. See generally Mordecai Kurz, *Endogenous Uncertainty and Rational Belief Equilibrium: A Unified Theory of Market Volatility*, in GENERAL EQUILIBRIUM: PROBLEMS & PROSPECTS 246, 246-48 (Fabio Petri & Frank Hahn eds., 2005) (distinguishing the “exogenous” from “endogenous” uncertainty as risk and volatility that arises from external, uncontrollable causes, including “weather conditions, earthquakes, technological changes, fire destruction etc.”).



levels of uncertainty—uncertainty that exists for all participants, not just those associated with emerging technologies.

### 1. *Jurisdictional Context*

Energy is a dynamic and often volatile field, resulting in regulatory uncertainties for all players involved. First, despite almost eighty years of FPA jurisprudence, the energy field is wrought with significant jurisdictional uncertainty. Under the FPA, FERC retains jurisdiction over wholesale electricity transactions and transmission rates, and states retain jurisdiction over retail electricity transactions and generation and distribution facilities.<sup>191</sup> Despite this seemingly bright line drawn by Congress, there is no shortage of litigation that has ensued over line-drawing exercises between retail and wholesale classifications.<sup>192</sup>

Electric utilities dealing primarily with fossil fuel-related energy sources are far from immune from uncertainty.<sup>193</sup> One example can be found in the latest jurisdictional struggle between FERC and the Commodity Futures Trading Commission (CFTC) over energy derivative “swap deals.”<sup>194</sup> Both agencies are claiming jurisdiction, and commentators have suggested that “the routine use of swaps to hedge market volatility due to weather, unforeseen demand, and other factors would be severely disrupted if regulated by the

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191. Section 201(a) grants FERC jurisdiction over “the transmission of electric energy in interstate commerce” and, therefore, over transmission rates. 16 U.S.C. § 824(a) (2012).

192. Electricity transactions are considered wholesale or retail, depending on whether the sale is sold for resale (wholesale) or whether it is sold directly to an end user (retail). See, e.g., *Pub. Utils. Comm’n v. Attleboro Steam & Elec. Co.*, 273 U.S. 83 (1927) (holding that while states could regulate retail sales of electricity via the Commerce Clause, they could not regulate wholesale sales); *S. Cal. Edison Co. v. FERC*, 603 F.3d 996 (D.C. Cir. 2010) (holding that FERC failed to establish jurisdiction over CAISO netting rates); *Cascade Natural Gas Corp. v. FERC*, 955 F.2d 1412 (10th Cir. 1992) (rejecting the notion that if the state commission cannot have exclusive jurisdiction, it should, at minimum, have concurrent jurisdiction due to the “local” nature of the distribution); Brief for Respondent, *Electric Power Supply Ass’n v. FERC*, No. 11-1486 (D.C. Cir. Oct. 25, 2012), available at <http://www.ferc.gov/legal/court-cases/briefs/2012/DC11-1486ElecPowerSupplyAssoc.pdf> (defending FERC’s characterization of demand response as a wholesale transaction subject to federal jurisdiction).

193. Although not jurisdictional regulatory uncertainty, another example of traditional energy sources being subject to regulatory uncertainty is coal. Although EPA has insofar only issued final carbon regulations for new fossil fuel plants, there is enough chatter about regulations for existing fossil fuel plants to generate regulatory uncertainty surrounding more traditional forms of energy products. Joanna M. Foster, *EPA Publishes First Rule Limiting Carbon Pollution from New Power Plants*, THINKPROGRESS (Jan. 9, 2014, 12:48 PM), <http://thinkprogress.org/climate/2014/01/09/3139921/epa-carbon-rule-power-plants>.

194. Thomas A. Utzinger, *Energy Companies Moving Forward with CFTC Compliance Despite Uncertainties*, REUTERS (May 31, 2012), <http://blogs.reuters.com/financial-regulatory-forum/2012/05/31/energy-companies-moving-forward-with-cftc-compliance-despite-uncertainties>.

CFTC.”<sup>195</sup> In addition to statutory and regulatory uncertainty, constitutional preemption principles can wreak havoc with local authorities’ exertion of authority over energy issues. This is well-illustrated by the recent controversies surrounding local authorities’ bans on hydraulic fracturing that are being challenged by states under preemption grounds.<sup>196</sup> Indeed, these few examples demonstrate that the jurisdictional uncertainty in the energy field is far from limited to emerging technologies.

Emerging technologies merely present ideal vehicles to challenge the jurisdictional limits. One recent example of an emerging energy service that has created jurisdictional uncertainty is demand response, customer-side curtailments in response to requests from grid operators. Because demand response occurs on the customer side of the meter, where states retain jurisdiction, many argue for state jurisdiction over demand response charges.<sup>197</sup> FERC, however, has recently exerted jurisdiction over demand response charges through Order No. 745.<sup>198</sup> In that Order, FERC treats demand response as the functional equivalent of producing energy for sale at wholesale, rates that are under FERC authority.<sup>199</sup> Creating another layer of regulatory uncertainty, the D.C. Circuit vacated FERC’s Order No. 745 as ultra vires regulation of the retail market in May 2014, a decision for which FERC is seeking *en banc* review.<sup>200</sup>

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195. *Id.*

196. Sorell E. Negro, *Fracking Wars: Federal, State and Local Conflicts over the Regulation of Natural Gas Activities*, ZONING & PLAN. L. REP., Feb. 2012, at 1, 1-2, available at <http://www.ourenergypolicy.org/wp-content/uploads/2013/07/Fracking-Wars.pdf>; See *Norse Energy Corp. USA v. Town of Dryden*, 964 N.Y.S.2d 714 (N.Y. App. Div. 2013); *Cooperstown Holstein Corp. v. Town of Middlefield*, 964 N.Y.S.2d 431 (N.Y. App. Div. 2013) (both holding New York’s Oil, Gas and Solution Mining Law does not expressly or impliedly preempt municipal land use laws).

197. In *EnergyConnect, Inc.*, 130 FERC ¶ 61,031 (2010), FERC determined that it “do[es] not regard agreements to provide services from only demand response resources to be jurisdictional facilities because they involve agreements to reduce demand, i.e., agreements not to purchase electric energy under certain circumstances, rather than agreements to sell electric energy at wholesale.” See *Demand Response Compensation in Organized Wholesale Energy Markets*, Order No. 745, 134 FERC ¶ 61,187 (Mar. 15, 2011) [hereinafter FERC Order No. 745]; see also *Wholesale Competition in Regions with Organized Electric Markets*, Order No. 719, 125 FERC ¶ 61,071 (Oct. 17, 2008) (requiring ISO/RTOs to accept bids from demand response resources in markets for certain ancillary services on a basis comparable to other resources).

198. See FERC Order No. 745, *supra* note 197.

199. *Id.*

200. See *Electric Power Supply Ass’n v. FERC*, No. 11-1486 (D.C. Cir. 2014), available at [http://www.cadc.uscourts.gov/internet/opinions.nsf/DE531DBFA7DE1ABE85257CE1004F4C53/\\$file/11-1486-1494281.pdf](http://www.cadc.uscourts.gov/internet/opinions.nsf/DE531DBFA7DE1ABE85257CE1004F4C53/$file/11-1486-1494281.pdf); *FERC to Seek en banc Review of Demand Response Ruling*, FERC (June 11, 2014), <https://www.ferc.gov/media/news-releases/2014/2014-2/06-11-14.asp#U7Gm5xaC22w>; see also *Ind. Util. Reg. Comm’n v. FERC*, 668 F.3d 735 (D.C. Cir. 2012) (upholding FERC’s approval of an RTO tariff aimed at demand response

## 2. Cost Recovery Context

Second, cost recovery is governed by a complex web of both regulated and restructured mechanisms, all of which are laden with inherent uncertainty. Traditional cost-of-service can involve a substantial risk of cost recovery of capital expenditures. As discussed above, public utility commissions allow utilities to recover under cost-of-service formulas based on the fixed and variable costs, coupled with a profit. Utilities are generally expected to make investments before they know how much will be recovered and how quickly. In fact, recovery of these investments usually does not begin until after the facility is operational.<sup>201</sup> Much like the FPA, most state regulation of utility rates incorporates a statutory “just and reasonable” standard, a vague standard imbued with uncertainty itself.<sup>202</sup> Recovery is governed by one or a mixture of a “prudent investment” and a “used and useful” standard, which has led to varying disallowed costs.<sup>203</sup>

Years of failed investments in nuclear power facilities, for instance, led to a body of law on stranded investments, as did the transition of some states from regulated to restructured retail electricity regimes.<sup>204</sup> Although FERC Order No. 888 now grants the

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measures, holding that the PUC had not met its burden of proof that the tariff impermissibly blurred the line between state and federal jurisdiction under the Federal Power Act); Hon. Jon Wellenghoff & David L. Morenoff, *Recognizing the Importance of Demand Response: The Second Half of the Wholesale Electric Market Equation*, 28 ENERGY L.J. 389, 405 (2007) (“[T]o the extent that demand response can be characterized as involving such a wholesale sale of electric energy, it would fall within the Commission’s jurisdiction under the FPA . . . [and] the Commission may facilitate demand response in wholesale markets because demand response directly and significantly affects wholesale rates.”).

201. Russell A. Feingold, *Regulatory Uncertainty: The Ratemaking Challenge Continues*, PUB. UTIL. FORTNIGHTLY, Nov. 2004, at 52, 54, available at <http://www.fortnightly.com/fortnightly/2004/11/regulatory-uncertainty-ratemaking-challenge-continues?page=0%2C1> (“[M]anagement has forgotten that utilities must invest in infrastructure and then file rate cases to earn on the investment.” (internal quotation marks omitted)). A few allow for preapprovals by the PUC. See SCOTT HEMPLING & SCOTT H. STRAUSS, PRE-APPROVAL COMMITMENTS: WHEN AND UNDER WHAT CONDITIONS SHOULD REGULATORS COMMIT RATEPAYER DOLLARS TO UTILITY-PROPOSED CAPITAL PROJECTS? 15-19 (2008) (discussing various options utilized by state PUCs for implementing pre-approved cost recovery).

202. See, e.g., CAL. PUB. UTIL. CODE § 451 (West 2013) (“All charges demanded or received by any public utility . . . shall be just and reasonable.”); KAN. STAT. ANN. § 66-101(b) (2012) (“Every electric public utility governed by this act shall be required . . . to establish just and reasonable rates . . . .”); S.C. CODE ANN. § 58-27-810 (2012) (“Rates shall be just and reasonable.”).

203. See, e.g., *Duquesne Light Co. v. Barasch*, 488 U.S. 299 (1989) (disallowing millions of dollars invested in nuclear plants that were never completed due to changing market conditions).

204. See, e.g., FERC Order No. 888, *supra* note 136 (noting that “the construction of nuclear and other capital-intensive baseload facilities—actively encouraged by federal and

right to recovery of stranded costs associated with wholesale transmission and distribution of electricity, there is still uncertainty about the legitimacy and valuation of such costs.<sup>205</sup> “On one hand, neither regulation nor the Constitution guarantee utilities a right to profits; on the other hand, consumers may pay high retail prices where regulators approve expensive utility actions.”<sup>206</sup>

The uncertainty faced by energy storage is not so far above the baseline level of cost recovery uncertainty in the industry such as to render it a complete obstacle to its development. For instance, FERC has expressly noted that the possibility of stranded costs caused by administrative errors is not unique to energy storage. “This possibility exists throughout the utility industry and is not uniquely attributable to utilities with energy storage operations.”<sup>207</sup>

In fact, an argument can be made that the likelihood of cost recovery for energy storage is even more likely. Although some forms of energy storage like CAES may be as expensive as or more expensive than traditional forms of energy infrastructure to construct, other forms of energy storage can cost significantly less than the alternatives. One example can be found in Wisconsin, where the PUC installed a magnetic energy storage system to upgrade its transmission line for stability, where the energy storage “provided the very short duration needed at roughly one tenth the cost and a faster, less intrusive installation” than alternative transmission upgrades.<sup>208</sup> Although this project sought cost recovery through FERC-regulated transaction rates, such a shorter start-up time means there is even less chance for the rules to change, and it is less likely that they could become “un-used” and “un-useful” prior to cost recovery in traditional regulated regimes.

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some state governments—contributed to the continuing cost increases and uncertainties in the industry” and “[b]etween 1985 and 1992, writeoffs of nuclear power plants totalled \$22.4 billion,” significantly reducing the earnings of the affected utilities); *see also* *Town of Norwood v. FERC*, 80 F.3d 526 (D.C. Cir. 1996) (where ratepayers sought review of a FERC order allowing a utility to recover 100% of its unamortized investment in a nuclear plant after the utility shut down the plant before its license expired); *Jersey Cent. Power & Light Co. v. FERC*, 810 F.2d 1168 (D.C. Cir. 1987) (where a utility sought review of a FERC order modifying the utility’s rate schedule to exclude a \$397 million investment in a nuclear power plant that was cancelled after construction commenced); *CenterPoint Energy, Inc. v. Pub. Util. Comm’n of Tex.*, 143 S.W.3d 81, 82-83 (Tex. 2004) (summarizing the stranded cost predicament of utilities following the partial deregulation of the Texas electric power industry in 1999).

205. FERC Order No. 888, *supra* note 136.

206. Mark Wiranowski, *Competitive Smart Grid Pilots: A Means to Overcome Incentive and Informational Problems*, 10 J. TELECOMM. & HIGH TECH. L. 361, 382 (2012).

207. FERC Order No. 784, *supra* note 12, ¶ 134.

208. ABDURRAHMAN ET AL., *supra* note 119, at 3.

In sum, energy stakeholders operate in a world with a significant baseline level of uncertainty, one in which investors nonetheless see fit to move forward with energy infrastructure. The uncertainty caused by an emerging technology like energy storage is not sufficiently outside the range of reasonable uncertainty that exists for many players in the energy industry.

### *B. Scope of Energy Storage Uncertainty*

A second relevant factor to aid in the characterization of uncertainty is the scope of the uncertainty involved. Scope refers to the extent of the impact caused by the uncertainty, which can include an assessment of short-term and long-term uncertainty. The varying scope and time-scale relevance has been recognized by Professor Hoffman, who has divided uncertainty into three categories that encompass "current implementation, medium-term measures and rules, and long-term political direction."<sup>209</sup> The narrower the range of impacts to the regulated entities, the less troublesome the scope.<sup>210</sup>

In one sense, the scope of the uncertainty faced by energy storage is expansive. The classification of energy storage affects not only the return on investment, but whether the project can even proceed. In this manner, the uncertainty of emerging technologies is distinct from that of existing technologies. Although one could characterize it as how cost recovery will proceed, the fact that there are multiple value streams incompatible with both regulated and market-based recovery means that there is also a chance that energy storage developers will not be able to obtain any cost recovery for certain aspects of a given energy storage technology.<sup>211</sup> But this uncertainty can be classified as short-term "current implementation" uncertainty, one that must be compared with the longer-term uncertainty.

In another sense, the scope of uncertainty faced by energy storage developers is continually being narrowed. Beyond the federal

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209. Hoffman et al., *supra* note 172, at 1237.

210. J.R. DeShazo & Jody Freeman, *Timing and Form of Federal Regulation: The Case of Climate Change*, 155 U. Pa. L. Rev. 1499, 1509-10 (2007) ("Regulatory uncertainty that are broad in scope may impose substantial costs."). As an example, pollution control statutes like the Clean Air Act mandate an agency to develop air quality standards for six specific criteria pollutants, but there may be regulatory uncertainty about how exactly those standards will be determined and what exactly those standards will be. The cost differential between one type of standard and another type of standard may be substantial, but narrower than the difference between complying with a standard and not having to comply at all. See Clean Air Act, 42 U.S.C. § 7408 (1990).

211. *Cf., e.g., Morgan Lee, SDG&E's Request to Recover 2007 Fire Costs Denied*, UNION-TRIBUNE SAN DIEGO (Oct. 16, 2012), <http://www.utsandiego.com/news/2012/Oct/16/sdges-request-to-recover-2007-fire-costs-denied/> (rejecting utility's costs to respond to fire damage in an opinion from the California Public Utilities Commission).

classification of energy storage, investors can look to other proxies to provide confidence in the federal regulatory treatment of energy storage. There are many other signals that investors should take into account beyond whether a federal agency will conclusively determine the proper asset classification label for an emerging technology. This is particularly important in determining the longer-term political direction. "To the extent that waiting leads to the resolution of some of the relevant regulatory uncertainty, the firm may face an option value to delaying investment."<sup>212</sup> But where a primary reason is to gather further assurances about the "state's commitment" to the cause, other proxies are important.<sup>213</sup> In this case, it is relevant whether FERC is taking any other action, positive or negative, with respect to energy storage.<sup>214</sup> This evaluation reveals that FERC is moving forward in ways that demonstrate its market support for energy storage, effectively narrowing the scope of uncertainty. As a government report indicated:

If the entity is in a centrally dispatched market like MISO, the ISO needs to have sufficient tariffs and other market mechanisms in place to enable the storage owner to achieve the full value of the benefits available from all of the storage facility's attributes. In the absence of such tariffs and market mechanisms, many of the potential benefits of the storage facility will go un-monetized, or will accrue to the benefit of market participants other than the storage owners.<sup>215</sup>

Effective market treatment for energy storage is particularly important since "much of the nation's energy infrastructure is now owned or being developed by independent power producers who lack utility-rate base cost recovery structures" and rely exclusively on market-based rates for recovery of their costs.<sup>216</sup> Accordingly, FERC has claimed jurisdiction over some of these energy storage services,

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212. Jun Ishii & Jingming Yan, *Investment Under Regulatory Uncertainty: U.S. Electricity Generation Investment Since 1996*, 6 (Ctr. for the Study of Energy Mkts., Working Paper No. 137, 2004), available at <http://www.ucei.berkeley.edu/PDF/csemmwp12.pdf>.

213. *Id.*

214. For a legislative perspective, see S. Res. 1030, 113th Cong. (2013) (enacted), S. Res. 795, 113th Cong. (2011) (enacted), and S. Res. 1845, 112th Cong. (2011) (enacted).

215. SCHULTE ET AL., *supra* note 150, at 79; see also DENHOLM ET AL., *supra* note 15, at 9 (The government has suggested that "perhaps the single greatest motivation for proposals to build new energy storage is the creation of markets for both energy and ancillary services including regulation, contingency reserves, and capacity.").

216. Comments of the National Hydropower Association on the June 16, 2011 Notice Inquiry Re Third-Party Provision of Ancillary Services; Accounting and Financial Reporting for New Electric Storage Technologies, FERC Dkt. Nos. RM11-24-000 and AD10-13-000, at 8-9, available at <http://www.hydro.org/wp-content/uploads/2011/08/NHA-Comments-on-Ancillary-Services-NOI-Final.pdf>.

issuing important rulemakings to enhance facilitation of energy storage services onto the grid.

First, in 2007, FERC issued Order No. 890, which required wholesale markets to consider non-generation resources (including storage and distributed resources) for grid services.<sup>217</sup> The order required that these non-generation resources be evaluated on a comparable basis to services provided by generation resources in meeting mandatory reliability standards, providing ancillary services, and planning the expansion of the transmission grid. This was an important recognition of the importance of non-traditional resources like energy storage, demand response, combined heat and power, and variable energy resources (renewables).<sup>218</sup>

Second, in 2011, FERC issued Order No. 755, requiring jurisdictional utilities to pay a premium for “faster-ramping resources” for regulation service, citing energy storage as an example of a technology that is not currently valued appropriately.<sup>219</sup> In the ISO and RTO markets, compensation for frequency regulation service is presently based on several complicated components.<sup>220</sup> FERC has found that “current frequency regulation compensation practices of RTOs and ISOs result in rates that are unjust, unreasonable, and unduly discriminatory or preferential” and has finalized new rules for frequency regulation services intended to level the playing field for energy storage.<sup>221</sup> In response to this order, a number of market operators have created new tariffs allowing storage to participate in ancillary service markets that resulted in expanded deployment of “124 MWs of energy storage by the end of 2012.”<sup>222</sup>

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217. Preventing Undue Discrimination and Preference in Transmission Service, Order No. 890, 118 FERC ¶ 61,119 (Feb. 16, 2007) [hereinafter FERC Order No. 890].

218. Comments of the Electricity Consumer Resource Council, FERC Dkt. No. AD10-13-000, at 3, *available at* <http://www.elcon.org/Documents/FERC filings/2010/FERC8-9-10.pdf> (“The threshold issue before FERC is the need to retool resource eligibility standards and to adopt the tariff and market rule changes that will enable access to wholesale power markets by non-traditional resources.”).

219. See FERC Order No. 755, *supra* note 68, ¶¶ 5, 11.

220. *Id.* ¶¶ 6-10.

221. *Id.* ¶ 2; FERC has noted that “current compensation methods for regulation service in RTO and ISO markets fail to acknowledge the inherently greater amount of frequency regulation service being provided by faster-ramping resources.” *Id.* With the exception of ISO-NE, the RTOs and ISOs limit compensation to frequency regulation resources to a capacity payment and net energy balancing. *Id.* ¶¶ 6-10. Until recently, the rate paid for frequency regulation services supplied by traditional fossil-fuel plants and gas-fired turbines was the same as the rate paid to fast-ramping storage systems such as batteries and flywheels. *Id.* ¶ 2.

222. ELEC. ADVISORY COMM., *supra* note 60, at 15. For example, Midwest ISO created a stored energy resources tariff. Midwest Indep. Transmission Sys. Operator, Inc., Order Conditionally Accepting Stored Resources Compliance Filing, 131 FERC ¶ 61,128 (May 10, 2010), *available at* <http://www.ferc.gov/EventCalendar/Files/20100510142914-ER09-1126->

Additional steps are being taken to address these potential problems in lieu of regulatory clarity on classifications. In July 2013, FERC expanded its rulemakings affecting energy storage with Order No. 784.<sup>223</sup> In addition to payment premiums provided for in Order No. 755, Order No. 784 now requires each public utility transmission provider to take into account the speed and accuracy of regulation resources in its determination of reserve requirements, two parameters where energy storage excels.<sup>224</sup> It also amends a historical restriction to now allow energy storage to provide ancillary services to transmission providers at market-based rates where appropriate.<sup>225</sup> Despite its embrace of uncertainty with respect to the classification of energy storage, FERC explicitly found that “there is a need for certainty in the accounting and reporting treatment for energy storage assets and operations, especially in instances where utilities seek to recover costs of energy storage operations in cost-based rates.”<sup>226</sup> In response, FERC issued a final accounting rulemaking that requires separate accounts for energy storage within each of the traditional asset categories to better allow FERC to “monitor these utilities’ operations to prevent and discourage cross-subsidization between cost-based and market-based activities.”<sup>227</sup>

Most recently, FERC issued Order No. 792, which revised the pro forma Small Generator Interconnection Agreement and Procedures to specifically include energy storage devices.<sup>228</sup> The revisions are designed to establish terms and conditions for public utilities to provide just and reasonable interconnection service for small generators.<sup>229</sup> This amendment to the original Order No. 2006 adds energy storage to the category of resources that are authorized to use these procedures or a fast track interconnection process and provides clarification on the sizing of storage devices.<sup>230</sup>

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001.pdf. Also, the New York ISO created a limited energy storage resource tariff. N.Y. Indep. Sys. Operator, Inc., Order Accepting Tariff Revisions, 127 FERC ¶ 61,135 (May 15, 2009), available at <http://www.ferc.gov/eventcalendar/Files/20090515142559-ER09-836-000.pdf>.

223. FERC Order No. 784, *supra* note 12.

224. *Id.* ¶ 1; see *supra* text accompanying notes 71-72.

225. *Id.* ¶ 9, 13.

226. *Id.* ¶ 124.

227. *Id.* ¶ 125 (Comments on the notice of proposed rulemaking demonstrate a wariness for increased administrative burdens, and alternative suggestions were to record the cost of an energy storage asset in a single plant account and allocate its cost to the various functions it performs using current ratemaking methods.).

228. Small Generator Interconnection Agreements and Procedures, Order No. 792, 145 FERC ¶ 61,159, ¶ 1 (Nov. 22, 2013) [hereinafter FERC Order No. 792].

229. *Id.* ¶ 2.

230. *Id.* ¶ 227-31.



Despite FERC's embrace of uncertainty with respect to asset classification, FERC's actions taken as a whole are not representative of an agency that is sitting on its hands, generating inconsistent outcomes, or otherwise fostering a high-risk, unsupportive environment for energy storage. On the contrary, as energy storage counsel has indicated that "[t]he main message that FERC is sending . . . is that we need these technologies, and markets should send signals that say we need them, we're going to pay for them. If companies are making money and can repay their shareholders, then more will invest."<sup>231</sup> Uncertainty in some short-term and long-term areas should be weighed against each other. For instance, although there is uncertainty about "current implementation" surrounding energy storage, these efforts demonstrate there is less uncertainty about the "long-term political direction" of energy storage.<sup>232</sup> This suggests that investment in energy storage should come despite uncertainty in some areas, so long as there are other signals that provide them some comfort.

### C. Source of Energy Storage Uncertainty

A third factor to assist in the characterization of uncertainty is the source of the certainty. Regulatory uncertainty can result from a wide variety of sources, including vague regulations,<sup>233</sup> agency inaction,<sup>234</sup> inconsistency in agency positions,<sup>235</sup> agency changes in regulatory

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231. Michael T. Burr, *What Happened at Beacon: Election Politics Almost Killed a Great Idea*, PUB. UTIL. FORTNIGHTLY, May 2012, at 4, 6, available at <http://www.fortnightly.com/fortnightly/2012/05/what-happened-beacon>.

232. Hoffman et al., *supra* note 172, at 1237.

233. The Supreme Court, for example, was recently obliged to resolve regulatory vagueness under the Clean Water Act in *Decker v. Northwest Environmental Defense Center*, 133 S. Ct. 1326, 1337 (2013), where it overturned a Ninth Circuit determination that logging road ditches and culverts are point sources that require a permit under the Clean Water Act. Justice Scalia, in dissent, delivered a powerful indictment of vague agency regulations, arguing that agencies are incentivized to issue vague rules because "the power to prescribe is augmented by the power to interpret . . ." *Id.* at 1341 (Scalia, J., concurring in part and dissenting in part).

234. See, e.g., E. Donald Elliott, *Global Climate Change and Regulatory Uncertainty*, 9 ARIZ. J. INT'L & COMP. L. 259, 263 (1992) (discussing the regulatory uncertainty caused by delayed regulation of an action like climate change). Definitive federal fracking regulations, for example, have been held in a sustained state of regulatory limbo as EPA completes studies investigating groundwater contamination and methane leakage associated with hydraulic fracturing. *Pub. Utils. Comm'n v. Energy Res. Conservation & Dev. Comm'n*, 197 Cal. Rptr. 866, 877-78 (Cal. Ct. App. 1984) (The court noted that while stakeholders are waiting for the commission to make its jurisdictional determination, "[t]he attendant delay, expense, and uncertainty might well create regulatory havoc.").

235. See, e.g., Adler, *supra* note 179, at 39 (noting regulatory uncertainty that can result from governmental commitments of questionable credibility that had been previously revoked); see also *United States v. Magnesium Corp. of Am.*, 616 F.3d 1129, 1141 (10th Cir. 2010) (explaining that an agency "remains free to hear new arguments,

goals,<sup>236</sup> changes in agency administrators,<sup>237</sup> judicial action reviewing agency action or rulemakings, and some combination of the above.<sup>238</sup> Governmental actors can even be both the source<sup>239</sup> and the recipient<sup>240</sup> of uncertainty, depending on the circumstances. Furthermore,

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make adjustments, and change directions" without having to undergo notice and comment because it "commits itself to a particular interpretation of its own regulation only when it adopts that interpretation *definitively* . . . ."); John Miller, *EPA Reverses Course, Nixes Idaho Pollution Rule*, ASSOCIATED PRESS (July 25, 2013, 10:43 AM), <http://news.yahoo.com/epa-reverses-course-nixes-idaho-144345912.html> (discussing the reversal of a state water quality rule that was approved by EPA two years prior).

236. It is common practice for the EPA to make various regulatory goals more stringent in response to updated scientific findings. See, e.g., U.S. ENVTL. PROT. AGENCY, REVIEW OF THE NATIONAL AMBIENT AIR QUALITY STANDARDS FOR OZONE: POLICY ASSESSMENT OF SCIENTIFIC AND TECHNICAL INFORMATION 6-81, available at [http://www.epa.gov/ttn/naaqs/standards/ozone/data/2007\\_07\\_ozone\\_staff\\_paper.pdf](http://www.epa.gov/ttn/naaqs/standards/ozone/data/2007_07_ozone_staff_paper.pdf) (concluding that new scientific information supported tightening NAAQS ozone standards); see also Juliet Eilperin, *EPA Tightens Soot Rules By 20 Percent*, WASH. POST (Dec. 14, 2012), [http://www.washingtonpost.com/national/health-science/epa-to-tighten-soot-rules-by-20-percent/2012/12/14/5d39c0c0-4541-11e2-8061-253bccfc7532\\_story.html](http://www.washingtonpost.com/national/health-science/epa-to-tighten-soot-rules-by-20-percent/2012/12/14/5d39c0c0-4541-11e2-8061-253bccfc7532_story.html). But see, e.g., Letter from Cass R. Sunstein, Adm'r, Office of Info. & Regulatory Affairs, to Lisa P. Jackson, Adm'r, Envtl. Prot. Agency (Sept. 2, 2011), available at [http://www.reginfo.gov/public/return/EPA\\_Return\\_Letter\\_9-2-2011.pdf](http://www.reginfo.gov/public/return/EPA_Return_Letter_9-2-2011.pdf) (rejecting EPA's proposal to revise the air quality standard for ozone based in part on the "needless" regulatory uncertainty that would result from revising the standards when another revision was anticipated in the near future).

237. Andrew B. Whitford, *The Reduction of Regulatory Uncertainty: Evidence From Transfer Pricing Policy*, 55 ST. LOUIS U. L.J. 269, 273 (2004) ("Regulatory uncertainty may come in the form of variations in antitrust policy with changes in administration or environmental policy due to changes in social tastes for protection."). EPA provided regulatory certainty on the question of the EPA's authority to regulate carbon dioxide under the Clean Air Act only to be reversed when a subsequent EPA Administrator took office, a decision that was later reversed by the Supreme Court. See *Massachusetts v. EPA*, 549 U.S. 497 (2007); Memo from Stephen L. Johnson, Adm'r, Envtl. Prot. Agency, to EPA Regional Administrators (Dec. 18, 2008), available at [http://www.epa.gov/NSR/documents/psd\\_interpretive\\_memo\\_12.18.08.pdf](http://www.epa.gov/NSR/documents/psd_interpretive_memo_12.18.08.pdf).

238. Patrick MacElroy, *Four Keys to Managing Regulatory Uncertainty*, BLACK & VEATCH, <http://bv.com/Home/news/thought-leadership/security-and-risk-management-issues/four-keys-to-managing-regulatory-uncertainty> (last visited June 14, 2014) ("Regulatory risk can take many forms, including legislation, court action or changes in regulatory goals." (citation omitted)); see also Chowdhury, *supra* note 189, at 637 ("Sources of ambiguity may include the structure and substance of the norms themselves, or the institutional mechanisms that enforce those norms, the lack of a clear adjudicatory mechanism in case of dispute over interpretation of those norms, etc. Herein it is important to underline that, since regulations change over time—it is a dynamic activity—uncertainty is therefore endemic to every regulatory system."). In addition, see the D.C. Circuit's recent reversal of FERC's order regarding demand response *supra* note 200.

239. Shapiro, *supra* note 183, at 10 (describing the federal legislature's bill that would add 2 to 2.5 years to the rulemaking ossification, thereby increasing regulatory uncertainty).

240. Jason Webb Yackee & Susan Webb Yackee, *Testing the Ossification Thesis: An Empirical Examination of Federal Regulatory Volume and Speed, 1950–1990*, 80 GEO. WASH. L. REV. 1414, 1430 (2012) ("The mere fact that OMB can reverse a regulatory decision might also inject significant uncertainty into the regulatory process, further discouraging the agency from acting.").

uncertainty is not a static concept. Even those seemingly certain regulations run the risk of becoming uncertain.<sup>241</sup>

Other scholars point to the failure of law to keep pace with technology, creating lags that generate pockets of uncertainty.<sup>242</sup> A survey of utility leaders, for instance, indicated that “regulatory uncertainty most often is caused by lack of longer-term direction and progression of regulatory decisions, unanticipated actions by regulators and their impact upon a utility’s current business strategies, . . . the potential for costs disallowances,” inconsistent application of policies by state regulators, and lack of regulator understanding of key issues facing utilities.<sup>243</sup> Uncertainty can be the result of one or more of these circumstances.

The source of uncertainty affects its treatment in at least two key respects. First, uncertainty may be less troublesome in cases where the regulator has intentionally embraced the uncertainty to harness its positive virtues than where the uncertainty has been thrust upon the regulated community due to a confluence of multiple circumstances. This is consistent with the biases that taint our

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241. For instance, consider the EPA’s proposed rule on the treatment of air pollution that migrates across state borders. The agency strived to reduce the uncertainty of the rule, engaged in notice and comment rulemaking, and issued a final rule. Rule To Reduce Interstate Transport of Fine Particulate Matter and Ozone (Clean Air Interstate Rule), 70 Fed. Reg. 25,162 (May 12, 2005) (to be codified at 40 C.F.R. pts. 51, 72, 73, 74, 77, 78 and 96). Despite this illusion of certainty, the D.C. Circuit struck down the rule just three years later. *North Carolina v. EPA*, 550 F.3d 1176 (D.C. Cir. 2008). The EPA’s second attempt at a revised rule in 2011 was again struck down by the same court. Federal Implementation Plans: Interstate Transport of Fine Particulate Matter and Ozone and Correction of SIP Approvals, 76 Fed. Reg. 48,208 (Aug. 8, 2011) (to be codified at 40 C.F.R. pts. 51, 51, 72, 78 and 97); *EME Homer City Generation, L.P. v. EPA*, 696 F.3d 7 (D.C. Cir. 2012); see also Kenneth Colburn, *Least-Risk Planning*, PUB. UTIL. FORTNIGHTLY, Nov. 2012, at 38, 41, available at [http://mag.fortnightly.com/display\\_article.php?id=1241684&\\_width=](http://mag.fortnightly.com/display_article.php?id=1241684&_width=) (The D.C. Circuit’s rejection of the EPA’s cross-state air pollution rule served “to perpetuate the profound regulatory uncertainty clouding the future of the electric power sector. At a time of great change in the energy industry, when substantial energy infrastructure investments are needed nationally and energy technology is a growing basis for international competitiveness, chronic regulatory uncertainty can have sclerotic economic consequences.”).

242. See, e.g., Gary E. Marchant et al., *What Does the History of Technology Regulation Teach Us About Nano Oversight?*, 37 J.L. MED. & ETHICS 724, 726-27 (2009) (“Lyria Bennett Moses has identified four potential problems that may result from the failure of law to keep pace with technology, including: (1) the failure to impose appropriate legal restrictions and precautions to control the risks of new technologies; (2) uncertainties in the application of existing legal frameworks to new technologies; (3) the potential for existing rules to either under- or over-regulate new technologies; and (4) the potential for technology to make existing rules obsolete.”); see also Feingold, *supra* note 201, at 53 (“Interestingly, more than 90 percent of survey respondents either strongly agreed or agreed with the proposition that regulatory uncertainty is caused by the energy market changing at a faster pace than the related regulatory policies that establish the rules of the game in the marketplace.”).

243. Feingold, *supra* note 201, at 53.

decisionmaking. For instance, one bias is a tendency to discount risks that are undertaken voluntarily and to exaggerate risks that are imposed upon us.<sup>244</sup> Similarly, stakeholders may discount the risks of uncertainty that are intentionally and voluntarily embraced. But such intentional, structured uncertainty may be partially justified by an agency's efforts to harness some of the advantages of uncertainty, including flexibility and the allowance of market-driven development.

Arguably the largest benefit of uncertainty is its ability to be flexible and responsive to varied facts and changing circumstances. Courts and agencies have repeatedly embraced agency case-by-case analyses in a number of contexts, driven largely by a desire to be flexible yet narrowly tailored to prevent a broadly applicable alternative that could both under-regulate and over-regulate.<sup>245</sup> Case-by-case treatment allows states and federal regulators to experiment with decisions that have individual impacts instead of risking an entire industry through sweeping regulations.<sup>246</sup>

The flexibility that accompanies this type of uncertainty is consistent with scholars who have emphasized the importance of adaptive mechanisms when dealing with emerging technologies. As Professor Buzbee has noted, although legal stability and knowable legal obligations are essential, there is a "stability-innovation

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244. Cass R. Sunstein, *A Note on "Voluntary" Versus "Involuntary" Risks*, 8 DUKE ENVTL. L. & POL'Y F. 173, 173-74 (1997) (noting that even though car accidents are more likely than airplane crashes, people discount the risk of car accidents because they have a greater sense of control over that risk); *see also* Nat'l Petroleum Refiners Ass'n v. FTC, 482 F.2d 672 (1973). *See generally* Lennart Sjöberg, *Factors in Risk Perception*, 20 RISK ANALYSIS 1, 2-3 (2000).

245. *See, e.g.*, SEC v. Chenery Corp., 332 U.S. 194, 203 (1947) (articulating the importance of both agency decisionmaking processes) ("[T]he agency must retain power to deal with the problems on a case-to-case basis if the administrative process is to be effective. There is thus a very definite place for the case-by-case evolution of statutory standards. And the choice made between proceeding by general rule or by individual, *ad hoc* litigation is one that lies primarily in the informed discretion of the administrative agency."); *Wis. Elec. Power Co. v. Reilly*, 893 F.2d 901, 910, 919 (7th Cir. 1990) (affirming EPA's use of a case-by-case analysis under the Clean Air Act to determine the RMRR under PSD modifications).

246. Importantly, such case-by-case treatment is distinct from inaction, which raises particularly pernicious questions of dereliction of duty on the part of regulators to address an urgent problem. *See, e.g.*, John M. Broder, *Groups Sue After E.P.A. Fails to Shift Ozone Rules*, N.Y. TIMES (Oct. 11, 2011), <http://www.nytimes.com/2011/10/12/science/earth/12epa.html> (rejection by the Obama Administration of stricter ozone pollution standards); *Five Groups Sue EPA Over Punt on Biogenic Greenhouse Gas Regulation*, P'SHIP FOR POL'Y INTEGRITY (Aug. 16, 2011), <http://www.pfpi.net/five-groups-sue-epa-over-punt-on-biogenic-greenhouse-gas-regulation> (withdrawal of regulations on biomass carbon emissions); *Groups Sue EPA After Agency Pulls Clean Water Act Enforcement*, NAT'L SUSTAINABLE AGRIC. COAL. (Sept. 3, 2013), <http://sustainableagriculture.net/blog/epa-cafo-lawsuit/> (withdrawal of proposed regulations on concentrated animal feeding operations).

tradeoff.”<sup>247</sup> In this case, even if innovations and improved results are possible, “legal strategies and resulting obligations” become solidified and are “seldom revisited.”<sup>248</sup> Professor Mandel has suggested that “[o]ne method for achieving adaptability and flexibility is for emerging technology governance to include mechanisms that allow for incremental changes in governance as the need arises.”<sup>249</sup> He highlights one of the benefits of emerging technologies in that it “often means that interests and organizations have not yet fully vested around a particular system or become wedded to a status quo.”<sup>250</sup> Professor Mandel recommends that “[a] particular system of governance should be developed, followed by data gathering, followed by result evaluation, followed by modifications to the system as warranted, in a continuing cycle until industry and scientific understanding has matured.”<sup>251</sup>

Another benefit of uncertainty may be its ability to yield to the market. This is particularly important where an emerging technology is at issue. These technologies involve extremely high capital intensity and infrastructure dependence, an uncertain revenue stream that depends on regulatory decisions, uncertainties about the technology’s performance and the regulatory context at scale, and a complex value-chain needing coordinated action from multiple relevant parties.<sup>252</sup> If the government were to intervene with a precise classification before the technology has matured, developers might tailor their investment decisions to the regulations as opposed to the market.<sup>253</sup> For instance, they might shape their investment

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247. William W. Buzbee, *Clean Air Act Dynamism and Disappointments: Lessons for Climate Legislation to Prompt Innovation and Discourage Inertia*, 32 WASH. U. J.L. & POL’Y 33, 35 (2010).

248. *Id.*

249. Gregory N. Mandel, *Regulating Emerging Technologies*, 1 LAW, INNOVATION & TECH. 75, 89 (2009).

250. *Id.* at 81; Belinda Bennett, *Expanding Horizons: Scientific Frontiers, Legal Regulation, and Globalization*, 19 IND. J. GLOBAL LEGAL STUD. 507, 524 (2012) (“[I]t is important to accept that a legal solution may only be temporary. This means accepting that laws may need to be subject to regular review, and possibly regular change, in response to new needs and new knowledge.”).

251. Mandel, *supra* note 249, at 89 (proposing options in final rules to avoid Administrative Procedure Act limitations on evolving regulations).

252. See, e.g., Varun Rai et al., *Carbon Capture and Storage at Scale: Lessons from the Growth of Analogous Energy Technologies*, 38 ENERGY POL’Y 4089, 4089-90 (2010), available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1400163](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1400163).

253. See *id.* at 4092 (“The optimal conditions for a technology’s validation exist when the strategic interests of government and businesses align.”); Elizabeth Burleson & Winslow Burleson, *Innovation Cooperation: Energy Biosciences and Law*, 2011 U. ILL. L. REV. 651, 679 (“Governments have a crucial role to play in . . . open innovation.”). But see Gaia J. Larsen, *Skewed Incentives: How Offshore Drilling Policies Fail to Induce Innovation to Reduce Social and Environmental Costs*, 31 STAN. ENVTL. L.J. 139, 150

decisions to avoid certain classifications or invest in those technologies that are treated more favorably by the agency. Regulating with too much specificity also has the potential to favor known existing technologies at the potential expense of unknown future technologies. In short, choosing a classification at this early point in the commercialization of energy storage may influence firm behavior in a way that is not the most beneficial.

Using traditional regulatory tools to drive technological innovation requires detailed knowledge about the desired course of technological change and what sorts of innovations are likely or foreseeable.<sup>254</sup> But government regulators rarely have the necessary information or foresight to drive innovation this way. Where the government is uncertain of either the technology or the best future use of the technology, it may make sense to allow other factors to drive these decisions. "Even if regulators were to identify a proper target initially, the regulatory process changes so slowly that regulatory standards would be unlikely to keep up with technological change or account for new information."<sup>255</sup> Instead of being driven by regulatory definitions, some uncertainty allows technologies to be driven by demand. In short, the government needs to send signals that it believes in the value of the emerging service, but not regulate so narrowly that it drives how or which precise technology develops to provide that service. This is not to say that intentional uncertainty will always yield positive results,<sup>256</sup> but that

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(2012) (explaining that the market alone does not foster enough innovation and that the government must intervene to influence technological innovation).

254. The International Energy Agency, for example, recently promulgated an implementing agreement between thirteen countries in order "to formulate effective policies that increase production and trade in [energy efficient appliances and equipment]." INT'L ENERGY AGENCY, TECHNOLOGY-FORCING STANDARDS FOR ENERGY EFFICIENCY: EFFICIENT ELECTRICAL END-USE EQUIPMENT (4E), at ii (2012). The Agency noted that far-reaching regulatory action concerning end-use electrical equipment was justified because technology-forcing standards for appliances would likely enable research and development, bring forward significant technology changes, and provide industry long-term regulatory certainty. *Id.* at v.

255. Adler, *supra* note 179, at 37.

256. Jon C. Dubin, *Overcoming Gridlock: Campbell After a Quarter-Century and Bureaucratically Rational Gap-Filling in Mass Justice Adjudication in the Social Security Administration's Disability Programs*, 62 ADMIN. L. REV. 937, 944 (2010) (finding that although the Social Security Administration's application of disability rules was intended to provide clarity, it instead led to inconsistent results, rendering severely disabled claimants, such as epileptics or psychotics, ineligible for benefits while rendering much less disabled claimants, such as arthritics, eligible); Andrew A. Lundgren, *Sarbanes-Oxley, Then Disney: The Post-Scandal Corporate-Governance Plot Thickens*, 8 DEL. L. REV. 195, 199 (2006) (pointing to the Sarbanes-Oxley Act as an example of legislation designed to grant flexibility but produced a climate that is "exactly the opposite of what Congress intended to do.").

there is a better chance for positive results when risks are undertaken than when risks are imposed.

Second, uncertainty may be less troublesome where there is unilateral as opposed to multiple sources. Uncertainty that is an involuntary confluence of multiple factors outside the control of any one actor is more troublesome than uncertainty that is intentionally embraced by a single actor. Multiple sources render it less likely that the uncertainty can be easily resolved and increase the transaction costs of reducing the uncertainty from multiple sources. To demonstrate this point, one need only look to the Cape Wind fiasco. In that situation, the stakeholders involved in developing the nation's first offshore wind farm experienced uncertainty from a myriad of sources, including the Department of the Interior, the state of Massachusetts, and even the Federal Aviation Administration, resulting in decade-long delays.<sup>257</sup>

Applying this factor to energy storage reveals a more discrete and manageable source of uncertainty. FERC responded to this uncertainty with an explicit embrace of it, declining to resolve the issue with general applicability and instead approaching each unique energy storage technology on a case-by-case, fact-specific basis. FERC has stated that "electricity storage devices, in a general sense, do not readily fit neatly into either of the traditional functions of generation, transmission or distribution."<sup>258</sup> Similarly, FERC Commissioner Moeller has said, "Our overall view is that energy storage is unique and doesn't fit neatly into the distribution or transmission box."<sup>259</sup>

For FERC to do otherwise may have been criticized as premature. Regulating with more certainty at this point in the emerging technology cycle may have caused more damage than good. It would have eliminated the flexibility inherent in the current case-by-case analyses and could have thwarted creativity and market-driven moves on the part of energy storage developers. For instance, if

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257. See Jay Lindsay, *APNewsBreak: FAA Felt Offshore Wind Farm Pressure*, ASSOCIATED PRESS (June 15, 2012), <http://bigstory.ap.org/article/apnewsbreak-faa-felt-offshore-wind-farm-pressure> (describing confusion over FAA's efficacy of modifications required for FAA permitting and subsequent allegations that FAA's ultimate permitting decision was politically motivated); Tom Zeller, Jr., *Cape Wind: Regulation, Litigation and the Struggle to Develop Offshore Wind Power in the U.S.*, RENEWABLEENERGYWORLD.COM (Feb. 28, 2013), <http://www.renewableenergyworld.com/rea/news/article/2013/02/cape-wind-regulation-litigation-and-the-struggle-to-develop-offshore-wind-power-in-the-u-s?page=4> (noting the novelty of offshore wind permitting and confusion as to whether the U.S. Army Corps of Engineers or the Department of the Interior held responsibility for the project's environmental review).

258. Western Grid Development, L.L.C., 133 FERC ¶ 61,029, ¶ 11 (Oct. 12, 2010).

259. Eric Wesoff, *FERC's Commissioner on Energy Storage*, GREENTECH MEDIA (Jan. 18, 2011), <http://www.greentechmedia.com/articles/read/the-view-from-ferc-on-energy-storage>.

FERC had expressly delineated the type of energy storage that satisfied their definition of a generation asset, firms may have tailored their investment towards those types of energy storage even if the grid was more in need of others.<sup>260</sup> By the same token, in addition to reaping some of the virtues of uncertainty, the singular source suggests that resolution of the uncertainty at a later point in time could be swift.

In sum, this Part demonstrates that the uncertainty associated with FERC's determination for energy storage is not sufficiently troublesome to justify inaction. Unlike many other types of uncertainty, this uncertainty was not caused by the juxtaposition of multiple actors or circumstances. On the contrary, the uncertainty surrounding energy storage was intentionally embraced, with an eye toward rendering the best outcomes, as regulators and stakeholders become familiar with the different energy storage technologies, values, and purposes. When the critical features of uncertainty are analyzed it becomes clear that this uncertainty is consistent with the general uncertainty that surrounds the energy industry, that the scope is narrower than other types of uncertainty, and that the source of the uncertainty is one federal agency intentionally seeking to reap the advantages of energy storage in a world where the law is struggling to keep up with the technology.

#### IV. STRATEGIES FOR RESOLVING THE REGULATORY UNCERTAINTY SURROUNDING ENERGY STORAGE

Political scientists have developed considerable organizational theory literature on the response of "the firm" to regulatory uncertainty.<sup>261</sup> In the simplest sense, the analyses can be categorized into four major response strategies: (1) avoid the uncertainty (2) ignore the uncertainty, (3) adapt to the uncertainty, or (4) advocate for more clarity to reduce the uncertainty.<sup>262</sup> The choice of response is affected in part by the type of uncertainty facing the firm, but as Professor Hoffman and her co-authors have observed, "investment decisions cannot be viewed solely from the perspective of

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260. See Engau & Hoffmann, *supra* note 17, at 55-56.

261. See, e.g., Alfred Marcus et al., *Firms, Regulatory Uncertainty, and the Natural Environment*, 54 CAL. MGMT REV. 5, 5-6 (2011).

262. Engau & Hoffmann, *supra* note 17, at 55 (arguing that "firms pursue four objectives when responding to regulatory uncertainty, seeking to either avoid, reduce, adapt to, or disregard this uncertainty").



regulatory uncertainty," and there are certainly other factors that trump this uncertainty.<sup>263</sup>

An avoidance strategy is usually reserved for the riskiest of endeavors.<sup>264</sup> As Professors Engau and Hoffman remark, "[H]igh regulatory uncertainty is more difficult to cope with than low regulatory uncertainty, therefore forcing firms without sufficient coping capacity to avoid uncertain regulatory environments and to shift their business to more predictable ones."<sup>265</sup> Avoiding the uncertainty usually involves postponing decisions, waiting for more clarity to prevent errors, or withdrawing completely from the enterprise.<sup>266</sup> This response is generally adopted by smaller firms experimenting with suspect technology that has not yet gained large-scale public commitment.<sup>267</sup>

Ignoring the uncertainty involves adopting a "no regrets policy," in which, unsure of how government regulations will affect the firm's future, they adopt as many strategies as possible at once.<sup>268</sup> This strategy is reserved for firms that are large enough to have a substantial reserve to adopt multiple strategies, allowing for success regardless of any regulatory outcome.<sup>269</sup>

Adapting to the uncertainty is reserved for firms whose success is threatened by the uncertainty of changes coming from new legislative actions.<sup>270</sup> The choices a firm makes in adapting its response to such

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263. Hoffman et al., *supra* note 172, at 1244 (identifying timing, complementary resources, and institutional pressure as other factors that can counter a response that postpones investments).

264. Engau & Hoffmann, *supra* note 17, at 59 ("[F]irms exposed to high regulatory uncertainty will avoid this uncertainty to a greater extent than firms facing low regulatory uncertainty."); Chowdhury, *supra* note 189, at 637 ("[O]nly when regulatory uncertainty reaches unmanageable proportions does it challenge and undermine the effectiveness of the regulatory system as whole.").

265. Engau & Hoffman, *supra* note 17, at 59.

266. See *id.* at 56; see also *Summit Farm, Inc. v. Comm'r*, 42 T.C.M. (CCH) 1240, 1243 (T.C. 1981) (There is "considerable legislative and regulatory uncertainty concerning whether this plastic container would be banned in Minnesota. . . . [P]rudence and good business judgment prompted Summit to adopt a wait-and-see attitude.").

267. Marcus et al., *supra* note 261, at 9-10 (giving an example of petro-algae, an immature technology today, as it remains unclear as to whether sufficient progress will ever be made to justify its commercialization).

268. *Id.* at 9 (explaining that an electric utility, for example, may be unsure of how government regulations will affect future energy prices and thus begin using multiple forms of energy—coal, natural gas, wind, renewable, and nuclear). A similar concept is an anticipator response. Christian Engau et al., *Airlines' Flexibility in Facing Regulatory Uncertainty: To Anticipate or Adapt?*, 54 CAL. MGMT. REV. 107, 117 (2011).

269. Marcus et al., *supra* note 20, at 9 (noting that electric utilities may have the financial reserves to adopt such a strategy but that start ups in energy efficiency may not have similar reserves and will thus be unable to adopt the strategy).

270. See, e.g., Nancy M. Carter, *Small Firm Adaptation: Responses of Physicians' Organizations to Regulatory and Competitive Uncertainty*, 33 ACAD. MGMT. J. 307, 307-08

uncertainty largely depends on costs—in these situations, firms aim to limit costs such as “loss of autonomy, increased dependency, and increased uncertainty.”<sup>271</sup>

Advocating for more clarity is used by those who are likely to benefit from such an investment. These firms participate in the policy process themselves, with the aim of influencing policymakers.<sup>272</sup> Contrary to an avoidance strategy, where a stakeholder may stay away until more information is available, an advocacy strategy seeks to enhance the effectiveness of the eventual decision by actively acquiring more information to narrow the scope of the uncertainty. Ernst & Young has documented an advocacy response for firms exposed to uncertainty from climate change: “The companies interviewed in this survey indicate a strong preference for more regulatory certainty, but to a large extent, they are not waiting for clarity and are positioning their businesses accordingly.”<sup>273</sup>

Importantly, one strategy may not be right for every type of energy storage stakeholder involved. The prior analysis in Part III demonstrates that energy storage uncertainty does not rise to the level deserving of complete withdrawal from energy storage. Energy storage’s foothold demonstrates that there are sufficient varieties that would not be classified as “suspect technologies.” Furthermore, the nation’s energy grid cannot afford such a wait-and-see approach.

By the same token, energy storage stakeholders should not pursue a “business as usual” approach that does little to track developments on energy storage. This is particularly true of stakeholders operating in traditional cost-of-service jurisdictions, where the prudence of investments is carefully evaluated.<sup>274</sup> It is important that these stakeholders not turn a blind eye to the uncertainty they face so as not to find themselves making decisions that a PUC may find imprudent.

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(1990). This type of strategic flexibility has also been analyzed in Engau et al., *supra* note 268, at 117-20.

271. Carter, *supra* note 270, at 308.

272. See, e.g., Engau & Hoffmann, *supra* note 172, at 48-49. See generally Amy J. Hillman et al., *Corporate Political Activity: A Review and Research Agenda*, 30 J. MGMT. 837 (2004); Brian Schaffer, *Firm-Level Responses to Government Regulation: Theoretical and Research Approaches*, 21 J. MGMT. 495 (1995).

273. ERNST & YOUNG, ACTION AMID UNCERTAINTY: THE BUSINESS RESPONSE TO CLIMATE CHANGE 10 (2010), available at [http://www.ey.com/Publication/vwLUAssets/Action\\_amid\\_uncertainty\\_-\\_The\\_business\\_response\\_to\\_climate\\_change/\\$FILE/EY\\_Action\\_amid\\_uncertainty\\_-\\_The\\_business\\_response\\_to\\_climate\\_change.pdf](http://www.ey.com/Publication/vwLUAssets/Action_amid_uncertainty_-_The_business_response_to_climate_change/$FILE/EY_Action_amid_uncertainty_-_The_business_response_to_climate_change.pdf).

274. See, e.g., Violet v. FERC, 800 F.2d 280, 281 (1st Cir. 1986) (noting that the Massachusetts Department of Public Utilities found that Edison Electric was imprudent in not cancelling a project once the “increased costs due to licensing delays, regulatory requirements, and uncertainty surrounding various other aspects of the project” had become “intolerably high”).

It is possible that the strategy being deployed by a number of wind farm developers could be categorized as “ignoring” the uncertainty. This strategy involves capitalizing on the existence of complementary resources, which can cause decisionmakers to invest despite a high level of regulatory uncertainty.<sup>275</sup> Many wind farms are pursuing this strategy, pairing energy storage with their wind farm resources already in existence.<sup>276</sup> Their ability to capture profits on their wind farms can only increase with energy storage, but these entities have diversified the risk to the extent that they will still profit regardless of the energy storage component.

Similarly, some stakeholders may be seen as adapting to the uncertainty facing storage. For instance, utilities in California have been approved to build “permanent load shifting” demand response, which is really a form of energy storage. By adapting its terminology to that already accepted within the regulatory framework, these utilities were able to seek approval for storage as part of their demand response funding.<sup>277</sup>

This Article urges energy storage stakeholders to engage in more advocacy responses.<sup>278</sup> As Professor Mandel has said, “[i]nstead of allowing the scientific and regulatory uncertainty to produce stagnation . . . it may be possible to leverage the uncertainty to achieve a more positive outcome.”<sup>279</sup> Energy storage developers could even benefit from investments in the face of regulatory uncertainty “if they gain a first-mover advantage.”<sup>280</sup> This Part provides some advocacy strategies for energy storage stakeholders to function

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275. Hoffmann et al., *supra* note 172, at 1244.

276. Notrees (Tex.), Xcel (Minn.), Laurel Mountain (W. Va.) and Tehachapi (Cal.) are all wind farms employing energy storage. See Jeff St. John, *Grid-Scale Energy Storage: 4 Ways to Grow in 2014*, GREENTECH MEDIA (Dec. 18, 2013), <http://www.greentechmedia.com/articles/read/Grid-Scale-Energy-Storage-4-Ways-to-Grow-in-2014>.

277. See, e.g., Decision Authorizing Long-Term Procurement for Local Capacity Requirements, Cal. Pub. Utils. Comm’n, Rulemaking 12-03-014, at 2 (Feb. 13, 2013), available at <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M050/K374/50374520.PDF> (approving Southern California Edison’s 2013 capacity procurement plan and imposing a requirement that 150 MW be procured through “preferred resources,” including demand response); see also S. CAL. EDISON, PERMANENT LOAD SHIFTING PROGRAM 1, [https://www.sce.com/wps/wcm/connect/a4e1543d-1cc7-46b3-8cf2-920cf3aa66af/SCE\\_PLS\\_ProgramGuides\\_20140205.pdf?MOD=AJPERES](https://www.sce.com/wps/wcm/connect/a4e1543d-1cc7-46b3-8cf2-920cf3aa66af/SCE_PLS_ProgramGuides_20140205.pdf?MOD=AJPERES) (last visited June 14, 2014) (explaining that Permanent Load Shifting “focuses on cooling [thermal energy storage] systems” in which “[c]ooling is produced and stored during the time when energy charges are lower and discharged at a later time when energy and peak demand charges are high”).

278. Cf., e.g., *Reuters Ltd. v. FCC*, 781 F.2d 946, 948-49 (D.C. Cir. 1986) (documenting the “assault” on the Commission to resolve regulatory uncertainty over the uses of microwave radio stations when applications lay dormant at the Commission).

279. Mandel, *supra* note 249, at 76.

280. Hoffmann et al., *supra* note 172, at 1228.

within the uncertainty, as well as some suggestions for federal regulators to facilitate these efforts.

### *A. Strategies for Energy Storage Stakeholders to Function Under Regulatory Uncertainty*

Implicit in both advocacy and adaptation strategies are affirmative actions to reduce or manage the extent of the uncertainty. Advocating for clarity requires a significant expenditure of capital, but FERC already has begun engaging with stakeholders on ways to properly integrate energy storage into the existing legal regime. For instance, stakeholders have proposed a number of solutions to resolve this asset classification uncertainty, including squeezing technology into one of the three existing categories,<sup>281</sup> creating an entirely new fourth category for energy storage,<sup>282</sup> or retaining the status quo.<sup>283</sup> This section suggests additional pathways for stakeholders to advocate for clarity. First, stakeholders can reduce uncertainty by harnessing the benefits of federalism and seeking state initiatives to fill the gap left by FERC. Second, stakeholders can petition FERC for affirmative rulings on jurisdictional or cost recovery questions. Third, stakeholders can continue to pursue additional funds for energy storage research and development to generate more information that further reduces the uncertainty. Each of these forms of actively reducing uncertainty is discussed below.

#### *1. Harness the Benefits of Federalism*

The first advocacy strategy for investors considering energy storage is to evaluate and encourage state actions that may drive certainty. An oft-discussed benefit of our federalist system is the ability of states to step in and fill a void left by the federal government.<sup>284</sup> Where the federal government is hesitant to provide

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281. See, e.g., LUONG, *supra* note 19, at 21, 29 (“[T]ransmission is the most discussed and controversial market for energy storage participation.”).

282. CHALLENGES AND OPPORTUNITIES, *supra* note 34, at 16 (“NHA recommends further evaluation of treating bulk energy storage as a separate and distinct electricity infrastructure asset class (i.e., Balancing Asset or Compensating Asset), capable of relieving grid stresses through the absorption of excess energy during low demand periods or rapidly providing capacity during periods of peak demand.”).

283. See LUONG, *supra* note 19, at 33 (“Increasing the renewable energy supply will eventually create needs for energy storage to supplement all components of the grid [including generation, transmission, and distribution markets]. As such, it follows that its roles be carved out within the existing energy market structure. A new energy storage asset category is not needed.”).

284. See, e.g., Shawna Bligh & Chris Wendelbo, Hydraulic Fracturing: Drilling into the Issue, NAT. RESOURCES & ENV'T, Winter 2013, at 7, 8-12 (exploring the proliferation of state fracking regulations in the absence of any comprehensive federal action).

clarity on an issue, as is the case with FERC, state legislatures and PUCs may act to force the issue. Although state initiatives with respect to energy storage could generate inconsistencies that drive stakeholders to appeal to the federal government for relief or clarification,<sup>285</sup> state initiatives may also be effective in establishing a path forward toward certainty. This may occur through successful state legislative or PUC programs that gather additional information or begin to coalesce around a more unified set of rules.

One example can be found in California, the first state to move toward providing more certainty for energy storage investments. In 2010, California passed the Energy Storage Law (AB 2541), which requires publicly-owned and investor-owned utilities to procure grid-connected storage systems where appropriate.<sup>286</sup> The new law directs the California Public Utilities Commission (CPUC) to open a proceeding to determine appropriate targets, if any,<sup>287</sup> for each load-serving entity to procure viable and cost-effective energy storage systems.<sup>288</sup> The law provides that an energy storage system is designed to “reduce the need for new fossil-fuel powered peaking generation facilities” and to “provide the ancillary services” fossil fuels had been providing,”<sup>289</sup> but it otherwise defines an “energy storage system” broadly to include centralized or distributed, or ownership by a utility, customer of utility, or merchant third-party, but with the requirement that it must reduce greenhouse gas emissions, reduce demand for peak generation, or improve the reliable operation of the transmission or distribution grid.<sup>290</sup> In February 2013, the CPUC began implementation of this law by requiring that fifty MW of Southern California Edison’s long-term capacity requirements come from energy storage by 2021.<sup>291</sup> In October 2013, the CPUC continued to implement the energy storage

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285. DeShazo & Freeman, *supra* note 210, at 1500 (“[S]tates can be important catalysts of a federal policy response by stimulating both pro-regulatory and anti-regulatory forces to appeal to the federal government for relief sooner rather than later.”).

286. CAL. PUB. UTIL. CODE § 2835(f) (2010) (such energy storage can be acquired through ownership or a contractual right to purchase electricity from a third party).

287. Notably, the bill could have set the procurement target at zero, largely eviscerating the impact of the law. The procurement targets must be “viable and cost effective.” *Id.* § 2836(a)(1).

288. *Id.* § 2837(c), (h). The law required the proceeding by March 1, 2012, adoption of an energy storage system procurement target by October 1, 2014, and attainment by December 31, 2016, and a second target to be achieved by December 31, 2020. *Id.* § 2836(b)(1)-(2).

289. *Id.* § 2837(c), (h).

290. *Id.* § 2835(a)(1)-(3).

291. Decision Authorizing Long-Term Procurement for Local Capacity Requirements, Cal. Pub. Utils. Comm’n, Rulemaking 12-03-014, at 2 (Feb. 13, 2013), available at <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M050/K374/50374520.PDF>.

mandate for all of California's investor-owned utilities by approving more procurement targets and mechanisms totaling 1325 MW of storage.<sup>292</sup>

Such mandates can provide important protection for investors who will be subject to cost of service recovery evaluations. They protect investors from the discretion of PUCs that are often unwilling to approve rate requests involving technologies that exceed those required by law.<sup>293</sup> Rejected as overkill that harms the ratepayers, these new technologies are often exactly the type of innovation being encouraged on other policy levels. Past efforts to bet on the winners of technologies that are not yet mandated have often left utilities disappointed. Instead, utilities are now counseled to wait to implement technologies until they are mandated and not jump ahead of the regulatory curve.<sup>294</sup>

Despite the benefit of mandates for utilities, such mandates also generate risks. Notably, such mandates do the exact opposite of the benefit of uncertainty cited above—whereas uncertainty allows the market to pick winners instead of the government, mandates allow the government to pick the winners.<sup>295</sup> Such technology-forcing endeavors have been widely criticized in the literature, running the

292. Press Release, Cal. Pub. Utils. Comm'n, CPUC Sets Energy Storage Goals for Utilities (Oct. 17, 2013), available at <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M079/K171/79171502.PDF> (Announcing Decision Adopting Energy Storage Procurement Framework and Design Program, Cal. Pub. Utils. Comm'n, Rulemaking 10-12-07 (Oct. 17, 2013), in which the CPUC established a combined energy storage target of 1325 MW for three large utilities.) For perspective, 1325 MW (1.3 GW) is enough to power 185,000 homes (and enough to power the fictional DeLorean time machine featured in *Back to the Future* (1.21 GW). See Joshua S. Hill, *Norway Greenlights 8 Wind Farms to Triple National Capacity*, CLEAN TECHNICA (Aug. 28, 2013), <http://cleantechnica.com/2013/08/28/norway-greenlights-8-wind-farms-to-triple-national-capacity/>.

293. See, e.g., Investigation of Merrimack Station Scrubber Project and Cost Recovery, N.H. Pub. Utils. Comm'n, Order No. 25,398, 2012 WL 3548030, at \*1 (Aug. 7, 2012) (allowing recovery of scrubbers as required by air pollution laws); Application of Va. Elec. & Power Co., Va. Corp. Comm'n, PUE-2012-00052, 2012 WL 3200605, at \*4 (Aug. 2, 2012) (allowing recovery of demand response programs required by FERC); see also David Markell & J.B. Ruhl, *An Empirical Assessment of Climate Change in the Courts: A New Jurisprudence or Business As Usual?*, 64 FLA. L. REV. 15, 47 (2012) ("[T]he regulatory requirements pertaining to emission of GHGs (or in many cases, the lack thereof) have had a significant effect on the outcome of permit proceedings and the reasoning of decisionmakers.").

294. See, e.g., MacElroy, *supra* note 238 (noting how Congressional inaction on carbon "left early adopters of carbon technologies without the market incentives needed to make them competitive").

295. "SDG&E argued against mandated targets, saying they would be a barrier to cost-effective deployment of storage: 'It is inappropriate, premature and difficult to establish a proper and cost-effective deployment level and ratepayers should not be burdened with the cost of uneconomic storage projects installed simply to meet a mandated target.'" Cal. Pub. Utils. Comm'n, Energy Storage Procurement Workshop 4 (Jan. 14, 2013) (remarks of San Diego Gas & Electric).

risk of forcing technology that is not yet ready for commercialization or picking a winner when another option turns out to be better.<sup>296</sup> The cumulative impact of such mandates on utilities should also be considered, as many states are already subject to mandates for renewable energy and energy efficiency, generating backlash.<sup>297</sup> Forcing these technologies too soon could result in disaster, with utilities being forced to invest in higher-risk technologies than they would otherwise invest in. Others have urged the inclusion of escape valves in case the target is set too high for technology to keep up, as the California energy storage mandate does, requiring the target to be reevaluated every three years.<sup>298</sup> Regardless of the outcome of California's experiment in federalism, such state actions can serve as a catalyst toward ultimately resolving the uncertainty.

A second example can be found in Texas, where the state stepped in to provide regulatory clarity for energy storage. Texas is in a unique regulatory position, being the only state among the forty-eight contiguous states with its own interconnection, excluding itself from FERC jurisdiction.<sup>299</sup> Although it does not address energy storage serving as a transmission asset, Texas has explicitly identified energy storage used to sell energy or ancillary services as generation for cost recovery purposes.<sup>300</sup> "Texas already deployed the nation's biggest sodium-sulfur (NaS) battery, which can power 4,000 residents in Presidio, Texas, for up to eight hours during an outage."<sup>301</sup> The utility, S&C Electric Co., is using a PureWave Storage

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296. *But cf., e.g.,* MATTHEW DEAL ET AL., CAL. PUB. UTILS. COMM'N, ELECTRIC ENERGY STORAGE: AN ASSESSMENT OF POTENTIAL BARRIERS AND OPPORTUNITIES 8 (2010) (The California PUC has acknowledged that it needs to "[c]ompare the costs and benefits of various types of EES with those of other load-shifting and emissions reduction strategies (including energy efficiency, demand response, and renewable energy procurement), in order to determine how ratepayer funds can be optimally committed.").

297. *See, e.g.,* John Funk, *FirstEnergy Wants to Cap Ohio Energy Efficiency Mandates, Arguing Costly Market Interference*, CLEVELAND.COM (Nov. 26, 2012), [http://www.cleveland.com/business/index.ssf/2012/11/firstenergy\\_wants\\_to\\_cap\\_ohio.html](http://www.cleveland.com/business/index.ssf/2012/11/firstenergy_wants_to_cap_ohio.html) (describing the Ohio utility that is desperately seeking a legislator to sponsor their bill freezing the energy efficiency mandates); Kyle Rosas, *Energy Storage Required*, BLACKLE MAG. (Oct. 2, 2012), <http://blacklemag.com/technology/the-importance-of-energy-storage/> (noting that in California, the energy storage mandate was opposed by all three major utility companies—Pacific Gas & Electric, Edison, and Sempra—as well as the consumer group Division of Ratepayer Advocates).

298. CAL. PUB. UTIL. CODE § 2836 (2011).

299. *Electric Reliability Council of Texas (ERCOT)*, FERC, <http://www.ferc.gov/industries/electric/indus-act/rto/ercot.asp> (last updated Oct. 17, 2011).

300. TEX. UTIL. STAT. ANN. § 35.152 (West 2011) ("Electric energy storage equipment or facilities that are intended to be used to sell energy or ancillary services at wholesale are generation assets."); *see also Project #39917*, PUB. UTIL. COMM'N OF TEX., <http://www.puc.texas.gov/industry/projects/rules/39917/39917.aspx> (last visited June 14, 2014).

301. Roberts, *supra* note 55, at 48.

Management System to control the system, including storing grid power and dispatching it back to the grid as needed. "This is the first time a state PUC has allowed rate-based recovery for a distributed energy storage project."<sup>302</sup> As stakeholders have indicated,

"[w]ithout the right pressure from the Public Utilities Commission (PUC), grid-scale utility storage will remain a good idea that will likely never get implemented." Ed Cazalet of Megawatt Storage Farms alluded to utilities that claim, " 'We can't sign this storage contract until we have a regulation telling us to do that.' "<sup>303</sup>

## 2. *Encourage FERC to Develop Case-by-Case Precedent*

A second strategy for functioning within this uncertainty involves stakeholders approaching FERC for advance orders on case-specific projects. FERC can assert jurisdiction over energy storage through either its authority over transmission services or through its authority over wholesale electricity transactions. Energy storage developers also can use FERC's processes to obtain affirmative orders from FERC regarding their specific asset classification situation, reflecting another advocacy response.

There are already a few examples of developers seeking an affirmative declaration from FERC that their energy storage facilities qualify as wholesale transactions under FERC jurisdiction or as "transmission assets" justifying incentive-based rates. In Norton Energy Storage, L.L.C., FERC held a compressed air energy storage facility was subject to its exclusive jurisdiction under section 201 of the FPA through its jurisdiction over wholesale electricity rates.<sup>304</sup> This compressed air facility converted non-storable electric energy to storable compressed air, a process known as the conversion/storage cycle.<sup>305</sup> FERC held it was this conversion/storage cycle that separated the storage facility from other facilities that consume energy that is sold for end use, an action outside the Commission's jurisdiction.<sup>306</sup> It reached this decision by comparing the compressed air facility to pumped storage hydroelectric facilities, which are traditionally subject to FERC jurisdiction under section 201.<sup>307</sup> A compressed air facility, like a pumped storage hydroelectric

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302. *Id.* at 49.

303. Eric Wesoff, *Energy Storage Needs Better Utility Policy, Language, Culture to Succeed*, GREENTECH MEDIA (July 28, 2010), <http://www.greentechmedia.com/articles/read/energy-storage-needs-change-in-utility-policy-language-and-culture>.

304. Norton Energy Storage, L.L.C., 95 FERC ¶ 61,476, slip op. at 7 (June 29, 2001).

305. *Id.* at 2.

306. *See id.* at 7.

307. *Id.*



facility “is not a source of new energy,” as the energy is converted but is not consumed.<sup>308</sup>

In *Western Grid Development, L.L.C.*, FERC classified a proposed sodium sulfur battery storage project as a wholesale transmission facility.<sup>309</sup> Like in *Norton Energy, L.L.C.*, the Commission used analogies to other energy facilities to reach its decision. Specifically, FERC compared the battery storage “to capacitors in the sense that they will be operated to provide electricity to the transmission grid to maintain system reliability, rather than to act as an energy or capacity resource.”<sup>310</sup> However, the Commission emphasized this decision was not a general policy determination regarding the jurisdiction of battery storage but rather limited to the specific facts of the facility at hand.<sup>311</sup> These batteries are similar to substation equipment already used in many wholesale transmission system facilities, will be operated by the California ISO, and will not participate in any wholesale electricity markets—all of which are characteristics that led FERC to designate them as transmission facilities.<sup>312</sup> *Western Grid* will pay retail energy prices when taking power from the grid, will receive retail credit when reliability concerns trigger a release of energy, and will also “pass through any incremental market revenues to customers through a PTO tariff.”<sup>313</sup> Importantly for those who are concerned about double-counting, *Western Grid* will not retain revenues outside of the transmission access charge.<sup>314</sup>

Although such case-by-case analyses can carry with them high transaction costs, they allow entities to realize one of the benefits of uncertainty—flexibility to respond to specific situations in lieu of an overbroad, one-size-fits-all approach. As is demonstrated above, they also begin to provide factual energy storage scenarios that provide benchmarks for analogizing and distinguishing future energy storage projects. Although there is disagreement about FERC’s approach to energy storage, forcing the issue will provide more opportunities for scrutiny and evaluation. The more applicants that use this approach,

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308. *Id.* at 8 (emphasis omitted).

309. *Western Grid Development, L.L.C.*, 133 FERC ¶ 61,029, slip op. at 1 (Oct. 12, 2010).

310. *Id.* at 6-7.

311. *Id.* at 6 (noting that this is subject to CAISO approval of projects through their transmission plan).

312. See *PJM Interconnection, L.L.C.*, *supra* note 92, at 4; *Western Grid Development, L.L.C.*, 130 FERC ¶ 61,056, slip op. at 14 (Jan. 21, 2010).

313. *Western Grid Development L.L.C.*, *supra* note 312, at 7.

314. *Id.* at 15.

the broader the precedent for energy storage will grow, establishing gradual norms that can narrow the range of uncertainty.

### 3. Develop More Information

A last strategy for functioning within the uncertainty is to develop more information through enhanced research and development. Stakeholders can use the period of uncertainty to gather superior information that leads to more effective and accurate decisionmaking. This is particularly the case where any harm caused by delaying regulatory certainty is surpassed by the benefits of a more informed decision.<sup>315</sup> As Professor Elliot describes,

By regulating too soon we may not only regulate the wrong thing, but we may regulate in the wrong way. To be more precise, it may be that if we had waited a little while, we would have developed regulatory tools and techniques that are better by an amount that more than compensates for the harm that comes about in the meantime.<sup>316</sup>

As much as certainty is valued, many stakeholders might value the opportunity to develop more information and shape the rules in a way that enhances effectiveness.<sup>317</sup> One advantage of withholding regulation, and thus creating uncertainty, is that doing so allows regulators more time to collect information, refine the purpose and feasibility of a law, and facilitate the proper means to implement their policies.<sup>318</sup> One example can be found in modeling advancements. MISO and PJM have independently determined that better modeling is required to better assess the role of energy storage

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315. Elliott, *supra* note 234, at 264-65 (pointing to the delay in providing regulatory certainty regarding acid rain as an example of a delay and period of regulatory uncertainty that resulted in better regulation compared to that of climate change).

316. *Id.* at 264; see also Warren G. Lavey, *Making and Keeping Regulatory Promises*, 55 FED. COMMS. L.J. 1, 15 (2002) (Even after significant time is spent developing a final decision, "the FCC may identify flaws in the rules it adopted from market experience, by assessing changing market conditions, by developing a new evaluation of options, or after judicial reversal.").

317. See, e.g., Fremeth & Richter, *supra* note 184, at 146 (arguing that more firms should use the advocating response in the face of environmental regulatory uncertainty, in which firms advocate for pragmatic, progressive policies, which enable them to shape future regulation in their favor). But see the extensive literature on rent-seeking, much of which suggests that stakeholders may use this opportunity only to shape rules in a way that favors themselves.

318. See Elliott, *supra* note 234, at 263; see also *id.* at 265 ("When we can afford to, we should wait until we understand a problem well enough to develop a sensible, effective regulatory approach—rather than rushing off to 'do something' as soon as the scientists tell us that there is a problem.").

in transmission planning.<sup>319</sup> Technology continues to advance to aid those in the energy storage community to find a way to integrate these multi-faceted services into the existing legal regime.<sup>320</sup> To do otherwise can have serious consequences. There could be more energy storage start-up bankruptcies and more discontent within the emerging industry if the agency jumped the gun and regulated before more complete information about the value, effects, and integration was developed.

This information gathering will be helped by recent public and private funds that have been earmarked for energy storage and other smart grid technologies. On the public level, the Advanced Research Projects Agency – Energy (ARPA-E) has received approximately \$770 million since 2009 to support the development of innovative energy technologies.<sup>321</sup> On the private level, “[a]ccording to a recent survey by Ernst & Young, energy storage was the largest segment for cleantech investment in the third quarter of 2011, increasing by 1,932 percent over the same period last year.”<sup>322</sup> The Internal Revenue Service is also providing a tax credit equal to thirty percent of the specified advanced energy property for qualifying advanced energy projects.<sup>323</sup>

Political scientists argue that “high regulatory uncertainty denotes a lower availability of information on the respective regulation than is available under low regulatory uncertainty.”<sup>324</sup> Therefore, as more information develops, stakeholders may serve to reduce the uncertainty surrounding energy storage even further. In

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319. MISO ENERGY STORAGE REPORT, *supra* note 78, at 1-4 (“MISO needs to improve storage modeling.”); *see also* ABDURRAHMAN ET AL., *supra* note 119, at 2 (PJM identifying better models as a fundamental need for energy storage); Bhatnagar, *supra* note 159, at 7.

320. “The new software will allow companies and utilities to understand how a given storage system could perform multiple functions, creating multiple streams of revenue that together allow the owner of the energy storage system to make a profit. It also does an analysis of which revenue streams are something that can actually be captured, given existing regulations.” Kevin Bullis, *Building the Business Case for Energy Storage*, MIT TECH. REV. (June 14, 2013), <http://www.technologyreview.com/view/516146/building-the-business-case-for-energy-storage/>.

321. *ARPA-E Awards \$130 Million for 66 Transformational Energy Technology Projects*, U.S. DEPT OF ENERGY (Nov. 28, 2012), <http://energy.gov/articles/arpa-e-awards-130-million-66-transformational-energy-technology-projects>.

322. KEMA, COPPER DEV. ASS’N, MARKET EVALUATION FOR ENERGY STORAGE IN THE UNITED STATES 4-1 (2012), *available at* [http://www.copper.org/about/pressreleases/pdfs/kema\\_report.pdf](http://www.copper.org/about/pressreleases/pdfs/kema_report.pdf).

323. “Specified advanced energy property” includes property designed for use in the production of energy from energy storage systems. *See* I.R.S. Notice 2013-12, Qualifying Advanced Energy Project Credit (2013), *available at* <http://www.irs.gov/pub/irs-drop/n-13-12.pdf>.

324. Engau & Hoffmann, *supra* note 17, at 59.

short, developers should have sufficient confidence and strategies to “power through” the uncertainty associated with energy storage.

### *B. Strategies for Regulators to Narrow the Range of Regulatory Uncertainty*

The approaches for stakeholders will be most effective if regulators can also work to narrow the range of uncertainty involved in energy storage. Although a number of strategies could be discussed,<sup>325</sup> this section considers two feasible options. First, PUCs can reduce cost recovery uncertainty through cost recovery protections. Second, FERC can reduce cost and jurisdictional uncertainty by providing some parameters to cabin its discretion and applying such parameters to produce consistent outcomes. Each of these is discussed below.

#### *1. Constrain the Regulatory Uncertainty*

Although mandates were discussed earlier as a way to constrain PUC discretion,<sup>326</sup> PUCs can also affirmatively act in ways to reduce the risks for new technologies. First, state PUCs may be able to provide some pre-approval for energy storage applicants in the form of a prudence determination.<sup>327</sup> As an example, a 2011 Florida law required risk reduction, in that “the [PSC] shall provide for full cost recovery . . . of all reasonable and prudent costs incurred by a provider for renewable energy projects that are zero greenhouse gas emitting at the point of generation . . . .”<sup>328</sup>

Second, some PUCs even allow utilities to implement creative alternatives to reduce their risk in questionable investments. PUCs have allowed “tariffed rates”<sup>329</sup> and feed-in-tariffs<sup>330</sup> to recover the

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325. See, e.g., Fabrizio, *supra* note 182, at 792 (discussing strategies that have been proposed to reduce the risk of investment, such as shared risk, and binding the regulatory body to make it more costly to change their mind).

326. See *supra* Part IV.A.1.

327. JIM LAZAR & DAVID FARNSWORTH, INCORPORATING ENVIRONMENTAL COSTS IN ELECTRIC RATES 17, 21-22 (2011), available at [www.raponline.org/document/download/id/4670](http://www.raponline.org/document/download/id/4670); Wiranowski, *supra* note 206, at 376-77 (“Utilities also face regulatory uncertainty, especially regarding cost recovery, so utilities often seek pre-approval from their regulators in the form of a prudence determination. . . . For example, if a utility can secure a statutorily guaranteed return for particular kinds of investments like renewable energy generation, it can avoid the uncertain process of the state regulator’s cost-benefit analysis for those investments.”).

328. FLA. STAT. § 366.92(4) (2011).

329. Public Service Company of New Mexico, N.M. Pub. Serv. Comm’n, No. 10-00037-UT, 2010 WL 3937778, at \*3 (Aug. 31, 2010).

330. Feed-in Tariffs, Haw. Pub. Utils. Comm’n, No. 2008-0273, 2009 WL 3756418, at \*1 (Sept. 25, 2009).

costs of renewable projects. PUCs have also granted greater weight to a utility's own estimate of costs and potential electricity production of a proposed project than an outside statistical estimate.<sup>331</sup> So long as the utility's projections have been made in good faith, a utility can sometimes assume that its numbers will be presumed legitimate instead of being worried that the PUC will always need to conduct its own study.<sup>332</sup> Other PUCs have approved "spot market prices" that lowered consumer's bills and reduced uncertainty for utilities.<sup>333</sup>

## 2. *Develop Parameters and Apply Them Consistently*

A second method for regulators to narrow the range of uncertainty is for FERC to adopt some limiting principles on its case-by-case assessment. For instance, although FERC was loathe to commit to specific qualifications, limits, or incentives required during its rulemaking on market incentives, FERC did provide three situations creating rebuttable presumptions that the requirements of section 219 are satisfied: (1) transmission projects that result from a fair and open regional planning process that considers and evaluates projects for reliability and/or congestion and is found to be acceptable to the Commission; (2) a proposed project located in a National Interest Electric Transmission Corridor; or (3) a project that has received construction approval from an appropriate state commission or state citing authority.<sup>334</sup> If energy storage meets any of these three conditions, its proposal for incentive-based rates carry a rebuttable presumption of approval.<sup>335</sup>

FERC also provided a number of other relevant parameters that it would apply to future decisions. First, FERC interpreted "section 219 to promote capital investment in a wide range of infrastructure investments that can have either reliability or congestion benefits rather than investments that have both reliability and congestion benefits."<sup>336</sup> Second, applicants are required "to show some nexus between the incentives being requested and the investment being made, i.e., to demonstrate that the incentives are rationally related to the investments being proposed."<sup>337</sup> Third, FERC will not

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331. *See, e.g.*, Public Service Company of New Hampshire, 70 N.H. P.U.C. 164, 224 (Apr. 18, 1985).

332. *See id.*

333. Retail Electricity Market: End State of Default Service, Pa. Pub. Util. Comm'n, No. 2011-2237952, 2013 WL 652517, at \*15 (Feb. 14, 2013).

334. FERC Order No. 679, *supra* note 141, ¶ 58.

335. *Id.*

336. *Id.* ¶ 42.

337. *Id.* ¶ 48.

impose size limits on eligible projects or condition approval on market power findings.<sup>338</sup>

FERC can develop similar benchmarks for energy storage, perhaps taking a functional approach to asset classifications. As more cases present themselves, categories will begin to develop and certain factual scenarios will become more predictable. If the industry can come to anticipate the outcome of these cases, a norm will eventually develop that can provide more confidence in expected future outcomes. Although there may not be consistency across jurisdictions, there should at least be consistency within a jurisdiction.

## V. CONCLUSION

There is no doubt about the vast potential found in energy storage. According to some estimates, “[t]he U.S. energy storage market exceeded \$1 billion in 2011 and could surpass the \$5 billion mark in 2014.”<sup>339</sup> “[A]nnual global demand for grid-scale energy storage will reach an astounding 185.4 gigawatt-hours (GWh) by 2017 and represent a \$113.5 billion incremental revenue opportunity for an industry that currently generates sales of \$50 to \$60 billion a year.”<sup>340</sup> In 2009, the U.S. Department of Energy (DOE) awarded \$185 million of \$778 million in smart grid funding to energy storage initiatives. DOE loan guarantees have supported many of the energy storage projects discussed above,<sup>341</sup> and legislation proposing tax credits for energy storage technologies continues to be introduced.<sup>342</sup>

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338. *Id.*

339. Roberts, *supra* note 55, at 46. “Lux Research predicts that the demand for grid storage applications will grow nearly ninefold from \$200 million in 2012 to \$10.4 billion in 2017.” Barbara Vergetis Lundin, *Pacific Gas and Electric Launches \$3.3M Energy Storage System*, FIERCEENERGY (May 29, 2013), <http://www.fierceenergy.com/story/pacific-gas-and-electric-launches-33m-energy-storage-system/2013-05-29>.

340. John Petersen, *Grid-Scale Energy Storage: Lux Predicts \$113.5 Billion in Global Demand by 2017*, ALT. ENERGY STOCKS (Apr. 4, 2012, 5:50 AM), [http://www.altenergystocks.com/archives/2012/04/gridscale\\_energy\\_storage\\_lux\\_predicts\\_1135\\_billion\\_in\\_global\\_demand\\_by\\_2017.html](http://www.altenergystocks.com/archives/2012/04/gridscale_energy_storage_lux_predicts_1135_billion_in_global_demand_by_2017.html) (citing LUX RESEARCH, GRID STORAGE UNDER THE MICROSCOPE: USING LOCAL KNOWLEDGE TO FORECAST GLOBAL DEMAND (2012), available at [http://info.luxresearchinc.com/Portals/86611/docs/research%20downloads/2012/grid%20storage\\_state-of-the-market-sample.pdf](http://info.luxresearchinc.com/Portals/86611/docs/research%20downloads/2012/grid%20storage_state-of-the-market-sample.pdf)).

341. See, e.g., U.S. P’SHIP FOR RENEWABLE ENERGY FIN., THE CLEAN ENERGY DEPLOYMENT ADMINISTRATION (CEDA): KEY ASPECTS & IMPROVEMENTS TO THE DEPARTMENT OF ENERGY (DOE) LOAN GUARANTEE PROGRAMS (2011), available at <http://uspref.org/wp-content/uploads/2011/07/CEDA-Analysis-2011-v2.0.pdf> (cataloguing loans made for renewable energy projects, including energy storage, under the DOE’s “Section 1705 Program”).

342. See, e.g., *New Bill Proposes Tax Credits for Renewable Energy Storage*, RENEWABLE ENERGY INSIGHTS (July 15, 2013), <http://www.renewableinsights.com/2013/07/new-bill-proposes-tax-credits-for-renewable-energy-storage> (remarking on Senator

To realize its full potential, however, energy storage also needs to be integrated into the labyrinth of regulated and restructured energy regimes. The uncertainties are numerous. It is unclear whether restructured market rules will allow energy storage services to compete on even playing fields. If the market rules are amended to allow more even competition between energy storage and traditional generation assets, it is unclear if the markets will account for the variety of energy storage services. It is unclear whether utilities will be able to receive compensation through their rates where many PUCs are focused on the least-cost alternative. Furthermore, different uncertainties are resolved at different times. For instance, it has been suggested that uncertainties in restructured markets may be resolved more quickly than those in regulated markets.<sup>343</sup> It will be interesting to see whether California's utilities respond to the new energy storage mandate by obtaining their own resources or whether they will contract with Independent Power Producers to fulfill the majority of their needs. This Article is not intended to minimize the challenges posed by regulatory uncertainty, but to caution our response. Without diagnosing the different varieties of uncertainty, we run the risk of perpetuating inaction.

By characterizing the regulatory uncertainty surrounding energy storage, this analysis reveals that it is of a manageable variety, a variety that will allow energy storage to develop even within a zone of uncertainty. In fall 2004, Navigant Consulting conducted a comprehensive survey to solicit the insights of utility leaders into the key challenges surrounding regulatory uncertainty and the implications on the rate-case and ratemaking activities of gas and electric distribution utilities. "The message, heard loud and clear, was that regulatory uncertainty is real and remains one of the most critical issues in the North American energy industry. It must be better managed."<sup>344</sup>

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Wyden's introduction of The Storage Technology for Renewable and Green Energy Act of 2013, S. 1030, 113th Cong. (2013), and predecessor proposals that were introduced in 2009, 2010, and 2011).

343. See Sydney Kaufman et al., *Electricity Storage in Regulated Markets: Getting the Rules Right*, ELEC. J., July 2011, at 63, 63-64.

344. Russell A. Feingold, *Utilities and Regulators: A Search for Harmony*, PUB. UTIL. FORTNIGHTLY, Nov. 2005, available at <http://www.fortnightly.com/fortnightly/2005/11/utilities-and-regulators-search-harmony>.